Logical responses to the unknowability of reality



Part 2

Model Theory of Perception. Strategies for choosing and validating our models of reality.

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Abstract

Contemporary neuroscientists show that our perception of the world is mediated through models, and in this book you will find ways for you to confirm that the models do not always show you reality "as it is".

We guess at what reality is really like, act based on those guesses and get feedback. We thereby build up a model of what reality is like. The model serves us to an extent. In this work however I propose that we often fail to validate our models and that this failing can be costly. I illustrate this with examples and discuss approaches we might take to improve our models, and explore areas of life where this understanding might usefully and practically be applied.

Collaboration

As with Part 1, I have chosen to keep the book slim, so it remains easily readable in one sitting. For that reason, and so that contributions remain welcome long after publication, the additional material is held online in the form of a blog at <u>https://impossibilityofknowing.blogspot.com</u>. Please send your comments to me by email or add them to the blog, whichever seems more suitable.

Acknowledgements

This work is the result of much contemplation which initially seemed to be quite esoteric, and I might not have considered committing it to print had I not come across highly respected researchers who had been working on these ideas way before me – initially Descartes, Berkely and Kant, and latterly Chris Frith, Anil Seth and Donald Hoffman. Thanks are due to Dr Frith who read an initial web project of mine and kindly encouraged me to continue working, to Ahmet Yavuz with whom I talked over the ideas over many lunches, to Sean Carter whose encouragement came at just the right time, to the community at Braziers who gave me time and space to put on talks for me to test the reception of the subject, to Claire Bankole my coach, and to many others who have encouraged and reviewed. Encouragement has been the greatest and most necessary gift, and I have been fortunate in receiving much more than I expected.

Before you start

Many of the concepts in this work are counter intuitive. A book will bring them together, but a video, presented by leaders in the field, can show the concepts much more vividly.

If you are able, please watch two TED talks of eighteen minutes each before starting this book:

https://www.ted.com/talks/donald_hoffman_do_we_see_reality_as_it_is

and

https://www.ted.com/talks/anil_seth_your_brain_hallucinates_your_consci ous_reality Anil Seth also gives a one hour presentation at the Royal Institution which allows for more examples, and is even more entertaining than his TED talk - <u>https://www.youtube.com/watch?v=xRel1JKOEbI</u>

Ideally you would also have access to the two books I make many references to:

"Making Up The Mind" by Chris Frith

"The Case Against Reality" Donald Hoffman

both of these excellent books are available in paper and e-reader formats

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Introduction

Why is this book needed?

Many people suffer from anxiety and depression, have strong resentments and anger issues, or simply find it hard to get along with others which can be alleviated through talking therapies and through learning techniques for exploring alternative points of view. Some are reluctant to take courses which could be helpful as they hear that they are frequented by people who are into "spiritual" matters, and they want nothing to do with spirituality, preferring to stick within the scientific world with which they are familiar.

I have a great deal of sympathy for their reluctance. At one time I was also convinced that solutions could only be found through an understanding of evolution and the plain science that has achieved so much over the last century or so, and which promises so much more too. Interestingly, it was through studying the philosophy of science that I came to find that there are indeed more solutions, but only if we are prepared to follow the science of perception where it logically goes.

I refer to the work of well-established neuroscientists, in particular Chris Frith and Donald Hoffman, and restate their findings that everything we think we know about reality is based on guesses, which although useful, may have little resemblance to objective reality. I've included some ways that you can verify their findings at home.

For the sake of accessibility I have collated key concepts of Frith and Hoffman's work and given it a name - *Model Theory of Perception* (MTP). I'm happy to relinquish the term, but it serves to limit the scope of my work and helpfully it is descriptive of their findings and of other researchers in the field of neuroscience and consciousness. There didn't seem to be an adequate term already in existence.

Once MTP is accepted, then one can see that any view one holds is open to

question, whether that view be a world-view, one's view of other people or one's view of oneself.

In addition to its potential use in psychological disorders, MTP has value in personal development and in promoting harmony between different world-views whether theist or not. It tells us that there is no such thing as a world-view of no-faith, that as all world-views are based on assumptions, and that we can simply choose a new world-view and try it out.

It's greatest value might be that it makes it easier for someone to say "I was wrong". I know from personal experience how transformational this is.

What is the structure of the book?

The first section is a presentation of the theory behind MTP. The ideas are not mine. The scientific research has already been done, and I take much from Chris Frith's book "Making Up The Mind" and Donald Hoffman's "The Case Against Reality". By briefly restating their ideas, I wanted to assure you that, however counterintuitive the ideas may be, they are on firm ground and fairly mainstream among present-day neuroscientists.

Early on I give simple demonstrations, that anyone can verify, which backup the claim by Frith and Seth paraphrased as

perception is a hallucination constrained by reality.

I show that all we think we know about the world, about others and about ourselves is in fact represented in mental models which are constructed through cycles of guesses, data gathering and data evaluation performed either by us or our forebears. These models are held in our minds, often with very little supporting evidence, and sometimes in spite of clear evidence to the contrary. The cycles of guessing and experimenting is a corollary of the work of these neuroscientists and appears at the end of the section. Finally I show that we can improve these cycles, and that it is well worth doing so.

The second section lists some practical application which are consistent with MTP. The link between MTP and these ideas might appeal to someone who likes more justification before exploring them. The ideas are certainly not new, and may appear quite familiar, but showing them to be consistent with MTP might give them more weight and suggest fresh avenues for exploration.

In that section I show how MTP lends support to some personal development courses that are available and which I've found particularly powerful, how MTP is useful for some psychological disorders and how it's useful in showing an equivalence between theism and atheism in that they both rely on faith. MTP doesn't however favour one or the other.

Assumptions

I base the main body of the work on sound science - science being the proposing of hypotheses and the gathering and interpreting of evidence for their support or refutation. The main assumption I make is that Darwin's theory of evolution by natural selection is valid. There does seem to be a great deal of evidence in support of it.

Other assumptions may be needed in some corollaries, but no others for the basic MTP and its main findings.

Why MTP - yet another theory?

It's not really my theory. Frith, Hoffman and others have developed all the content of the theory, showing that we perceive only a model of reality yet no one has yet given it a name. I'm simply giving their work a name that encapsulates my understanding of what they have found. Hoffman has been developing the Interface Theory of Perception, but the term "interface" seems to focus our attention on the perception of objects only in time and space. The Model Theory of Perception is not at odds with Hoffman's theory, yet it is my hope that replacing *interface* with *model* in the name will help people understand that the same principles which apply to familiar areas like vision, also apply to areas of cognition such as pain, social situations and worldviews.

Reality is unknowable, but wisdom is still available

I have sensed a frustrating theme in my reading of philosophy which is that many philosophers are trying to find out what reality fundamentally is, and what consciousness fundamentally is. This quest seems far from resolved, and I wouldn't be surprised if it were ultimately impossible to resolve. The Model Theory of Perception doesn't even try to state what reality might be. Instead it works by taking what we have found out so far, and fully acknowledges what is unknowable. In spite of this unknowability, we can still arrive at wise and practical courses of action, and that is what the reader is offered.

I look forward to hearing from you whether this is indeed what you find.

A brief introduction to models

The definition from Wikipedia at the time of writing is very good in my view:

A model is an informative representation of an object, person or system.

Since the whole value of the book is based on what I call the Model Theory of Perception, a good place to start would be with an understanding of what a model can be. So, in addition to the definition above, I've added some examples which I hope will be useful.

A street map of Portsmouth A hill walker's map of the Peak District in England A map of the London Underground A circuit diagram of a music amplifier A set of sticks and polystyrene balls of various colours arranged to represent a caffeine molecule A wave tank at a naval research establishment An encyclopaedia entry for hydrogen sulphide

A few qualities are worth noting^{*}:

• a model usually doesn't simply inform, but helps one interact more successfully with the reality it represents.

^{*} It is not essential that you agree with these characterisations of models. I include them only so that I give some flavour for people for whom the idea of a generalised model might be new. Whatever your idea of a model, it is probably sufficient. These characteristics derive from the work of Herbert Stachowiak.

- a model is always simpler than the reality it represents. For example a street map leaves out the quality of the road surface.
- a model is limited in the scope of the reality it represents. It's a model of a particular aspect of reality like the geography of a hill, a town's road system or a single molecule.
- a model relates to a specific class of user for a specific class of purposes. For example hill-walkers with the purpose of walking safely to landmarks.

With a wave tank naval engineers can make predictions about how changes to a ships design might affect its performance

With a model of a caffeine molecule chemists can make predictions about which other molecules might have similar properties.

The encyclopaedia's entry on hydrogen sulphide helps a reader understand the dangers of the gas and how to identify it.

There are also more dynamic models such as those found in London's Whitehall War Rooms in during the 1939-1945 world war. The models here were maps with movable objects representing enemy or allied units, equipment and other resources. They were created from information received by telephone and updated minute by minute. The ultimate source of the information was people who often had very limited information themselves. Regardless of the quality of the supplied data, a model was necessary to more successfully interact with the reality of enemy actions and allied resources.

With all these models, the modeller doesn't need to know the ultimate reality of what they represent. They simply have to come up with a useful way of representing the aspects of reality that the user is going to interact with.

The cartographer for the London Underground map needs simply to find the connections between stations and lay them out in a handy schematic way.

They could create the map by simply riding the trains. They don't need to find out about, for instance, the additional rail sidings nor would they need to know the depth of the tunnels.

An Ordnance Survey cartographer producing the hill-walker's map has a tougher job. It's necessary to measure the heights, distances and angles using proper surveying equipment. But when it comes to ground cover, there is a limited choice or representations - deciduous, coniferous or mixed woodland, built-up areas and a handful of others. The idea is to put on just the right amount of information for the walker to get on with their purpose, and to present it in an easily assimilated way. Too much information, and it would be difficult to quickly see what's important. If you're on a hill towards the end of the day and the weather is turning poor, then speed of comprehension is indeed important.

With the war room models, speed of comprehension was of the utmost importance as the enemy situation was rarely stationary and decisions needed to be taken often with extremely significant outcomes. It was also important that the results of actions taken in the field were fed back to the war room as soon as possible so the leaders could see if the expected outcomes were actually achieved. This feedback would help the leaders decide how much confidence to have in the model and whether more data was needed or perhaps a different interpretation of the existing data.

Model Theory of Perception - MTP

Perception is about how we represent reality in our consciousness, so consciousness and perception are closely bound up. Just to say at the outset - MTP has nothing to say about what consciousness *is*, only about how it seems to work.

Terminology

The term "Model Theory of Perception" (MTP) is inspired by Hoffman's term, and by Chris Frith's claim that "What we perceive is our brain's model of the world, not the world" [ref. "Making up the Mind" p. 132]. MTP is consistent with idealism and with top-down processing.

I'm happy to relinquish the term, but there doesn't seem to be any other adequate term already in existence.

A history of terminology

I use the term *Model Theory of Perception*. It's not a new idea, only a new label for, and a bringing together of existing ideas. It derives from idealism, top-down processing and the Interface Theory of Perception (ITP). I find the first two terms to be quite undescriptive and the implication of the last to be unhelpful for this book. For further details, internet search engines lead to good explanations of the terms.

Undescriptive term 'Idealism'

MTP is consistent with much of what Descartes had to say. His position is labelled as idealism. Philosophers are familiar with what this conveys, but the word doesn't help a newcomer to the field. Descartes is credited with introducing the idea that we don't have direct access to fundamental reality and can say little about it with certainty. Kant was also an idealist and many philosophers have followed that line. One alternative view of fundamental reality is physicalism. Respected researchers such as Francis Crick, and many others, have made claims which seem to put them more in the physicalist camp than the idealist.

Undescriptive term 'Top-down processing'

MTP is consistent with top-down processing. Again, nothing is conveyed by the phrase *top-down processing*, so it's another barrier to understanding for the newcomer. J.J. Gibson was a proponent of bottom-up processing. Anil Seth, Chris Frith, Donald Hoffman and many others are proponents of top-down processing.

ITP - Descriptive but having a different focus from MTP

MTP is consistent with the *Interface Theory of Perception*, a term coined by Donald Hoffman, in his book "The Case Against Reality" [ref. p. 76]

What is MTP?

To reiterate, MTP is consistent with limited forms of idealism, ITP and with top-down processing.

MTP says that

- we should assume that consciousness might be independent of physical stuff and might simply exists as a fundamental entity
- what we perceive of objective reality is only a model of it based on how objective reality behaves
- all perception and conscious thought is mediated through models

We have models of objects, models of ourselves and models of how we relate with others. Our worldviews are also models. One worldview is that which we develop as infants, which I call the Naïve Perception Theory. In Naïve Perception Theory we believe that reality is directly observable - what you see is what's really out there. For example the redness that we see on a tomato really belongs with the tomato. Even when we understand that Naïve Perception Theory is flawed, it is still the one we tend to live by day to day. When I cross a road and I see a car coming at speed, I don't stop to question the Naïve Perception Theory as it works in keeping me safe in that scenario. MTP can be difficult to comprehend and accept partly due, I suspect, to the fact that Naïve Perception Theory is so highly ingrained in us and that it doesn't need to be questioned for our day to day living.

Why MTP?

MTP is a logical foundation from which to explore some aspects of psychology, personal development and world-views.

We are fortunate that there is considerable evidence for this theory. Some is

from careful studies in laboratories, but some is available to everyone in their own home.

MTP shows us that everything we think we know about reality is simply a belief, albeit sometimes with a lot of evidence to back it up. I reckon many personal troubles and misunderstandings between people might stem from them believing that they know how a situation really is and not (as MTP says) that the situation they perceive is simply their current guess. I contend that MTP could very well have value in at least:

- promoting harmony and understanding between people of different worldviews such as atheists, agnostics and adherents to various religions
- psychological therapy how we model ourselves
- promoting better relationships with those people we are close to

I very much hope that this work will be both accessible and valuable.

How we explore this?

We need to first look at perception through the main senses such as vision. Once the basics are thus established, we will see that MTP is applicable in all areas of consciousness and how it delivers the value I mentioned above.

Models of reality - elements involved

My Perception Is Not of the World, But of My Brain's Model of the World

Frith, Chris. Making up the Mind: How the Brain Creates Our Mental World (p. 132). Wiley.

Fundamentals

Brain, consciousness and the mind.

We know a lot about the brain. We can lift one out of a skull during an autopsy. We can prod around in a living one. It has about one hundred billion neurons. We have studied neurons for decades and know a lot about how they work, transmitting electrical pulses along their length and then across synaptic gaps. We know many correlations between regions of the brain and conscious experiences.

It's a different matter for consciousness. Although we don't know what consciousness is in terms of anything else, and we can't prod it in the same way as we can a brain, we do have experience of it - a lifetime's intimate experience of it. The purpose of this book is to derive practical value from what we can currently establish about consciousness, given the results of robust research up to now, while happily admitting the vast amount we still do not know.

Our ordinary understanding of the brain and of consciousness is quite sufficient for this book. As for *mind* I have a special definition. I define it is *that which creates or holds conscious experiences*. It may turn out that the mind is the same as the brain, in which case no harm has been done. I would simply have introduced a little redundancy of terminology. We have no idea how a brain could create conscious perceptions, yet we are certain that we do have conscious perceptions, so it's not unreasonable to entertain the thought that the brain and mind might not be identical. Something generates and holds conscious experiences, and whatever it is, that is what I call 'the mind'. It doesn't matter what it *is*; it's what it *does* that is important for this study. There is a significant correlation between brain activity and conscious experience but correlation is not the same as causation, and in this book this is a distinction of the utmost importance.^{*}

Qualia

Neuroscientists claim that our perception of the world is of a model that is held in the mind. What is this model made from? There is a term *qualia* which is used in studies of perception. It has several definitions. I'm going to give it a particular definition here. Qualia are the elements that are used in the mind to construct perceptual models.

From qualia's Wikipedia entry today I got "Examples of qualia include the perceived sensation of pain of a headache, the taste of wine, and the redness of an evening sky ". These all fit my definition.

It is probably useful to state here that the singular of qualia is quale.

Beliefs

We will see in the section of evolution, that there can be no qualia without beliefs which connect sets of qualia with possible actions and outcomes, and these outcomes are also represented by qualia. Beliefs also connect qualia with sensory data.

The path from correlation to causation, to be sure, is fraught with pitfalls: if a crowd forms at a train platform, then often a train soon arrives. But crowds don't impel trains to roll in. Something else—a train schedule—creates the correlation between crowds and trains.

[Hoffman "The Case Against Reality" p.12]

^{*} Donald Hoffman points out the important difference between correlation and causation:

It's as simple as that. Mental models are composed of qualia and beliefs. I expand on these definitions in the sections which follow.

Models of reality - a few examples

The models I describe below all have their usefulness, but are useful only in certain domains. One might say a 1970's London Tube map is useful, but only for ordinary journeys by able-bodied people. You would be unwise to use one if you were an engineer wanting to inspect the rails, or were a wheelchair user.

Intuitive, naïve or day-to-day

This is the view that my eyes are like cameras on the world, taking in pictures, and what I see is exactly what is "out there". Similarly, that there are sounds "out there" that I just have to listen to. It's a useful view. It enables us to cross the road safely relieving me of much thinking which would slow down the process and increase the danger. It also serves us well in finding food and finding a mate. Although it comes as a surprise to many, Frith, Hoffman and others show that, in spite of its usefulness, this model is easily shown to be a fiction. In spite of this, the domain of usefulness is nearly all daily tasks.

Flat Earth

This forms part of our day-to-day model. We don't need to take into account the curvature of the Earth when we walk to the shops or take a bus into town. We can tell that we are happy with a flat earth model when we find ourselves talking about sunrise and sunset. It's not that we don't have the intellectual knowledge that the Earth is round, but that knowledge is not part of our day to day model. The domain of usefulness of this model is again nearly all daily tasks, but it's not valid when booking flights, making calls over time zones and astronomy.

Copernican/Newtonian

This is an intellectual model. We have to put a little mental effort in to remind ourselves of the fact that the Earth is a spherical planet, and even more if we are to properly imagine the planets to scale. I'm sure many of us will have in mind convenient drawings in school text books, or demonstrations with fruits. These are usually way short of the truth.

There are a few scale models around which give one a sense of the true dimensions, the one I've visited being in Otford in Kent. In this the Sun is represented by a hemisphere of 303mm diameter, and the Earth by a circle of diameter only 3mm at 32 metres from the Sun. There are some lovely photographs at

https://www3.astronomicalheritage.net/index.php/heritage/placesconnected-to-the-sky?place=otford-solar-system-united-kingdom

Even having touched the models and walked between them, I still find myself imagining a very condensed and distorted solar system when, for instance, reading about trajectories of inter-planetary missions.

This model's domain of usefulness includes getting people to the moon, but it's not valid when measuring precise orbits of planets and precise locations of stars as relativity needs to be taken into account for these measurements.

Physicalist/materialist

This is the mental model of reality where everything is in space and time. This is similar to the intuitive model, in that one has the model because it looks like that's how reality is. We start with the flat earth model as children, then accept intellectually the Copernican model as we learn more, like I did when watching the Apollo flights on the TV. As we read and hear more about scientific discoveries, we learn than the Big Bang is fairly universally accepted in science and it seems only natural to expand from the Copernican model. So many phenomena are now explained by reference to space-time. Forces are mediated by fields in space. Gravity is mediated by curving space itself around anything with mass. Space and time behave somewhat unexpectedly when we consider very high speeds, but it's still space-time. One of the only phenomena that hasn't been explained is consciousness. Although scientists have made precious little headway in some key areas of the "hard problem of consciousness"^{*}, many believe it's just a matter of time before the problem is solved. The physicalist model is shown wanting in the area of consciousness, but it is a highly useful model for many situations, and is one which even those who profess to be idealists, find themselves using to a great extent.

The domain of usefulness is under debate. We certainly use the model for nearly all science, but it does fail to come up with answers when we ask where consciousness fits into the model. It also may have some trouble with causality, in particular the cause of the Big Bang. I'll explore this in section 2.

Atheist

This is a model where reality came into being without any deity *wanting* it to come into existence and without any such deity being involved in our lives.

Theist

This is a model where there *is* a divine being who set up the reality we live in and who takes an interest and an active part in our lives. Clearly a divine being doesn't fit into a physicalist model, but many religious people still live their day to day lives using the day-to-day model described at the top of this chapter. Spiritual leaders, such as Jesus, have indeed encouraged followers to use the day-to-day model for day-to-day tasks, one example being the discussion about the Roman taxes.

^{*} David Chalmers, 1995, https://consc.net/papers/facing.pdf

Agnostic

This is a position where one declares no knowledge about any divine being, but is prepared to admit the possibility of one. I'm not sure how to translate this into a model, since we are to see later in this study that none of us can know for certain whether our model is true.

Deterministic - absence of libertarian free-will

This is a model which can be held intellectually, but is very difficult to adopt as a model in real life. Galen Strawson claims quite convincingly that there can be no possible mechanism for libertarian free will, yet his book "Freedom and Belief" explains why we live as though we actually do have libertarian free will. One only has to listen to recorded arguments between proponents of determinism and proponents of libertarian free will to hear them both seeming to use free will for the debate. Although this model is held intellectually by a great many people, I can't see any domain of usefulness outside a philosophical debate.

Libertarian free-will existing

This is a model which, according to Strawson (see reference above), we all hold day to day, but have no concept about any possible mechanism. Although we all hold the model, many claim that we hold it erroneously. We do however use the model in nearly all our day to day interactions. Whenever we hold someone accountable, including ourselves, for something done or not done, we are assuming they could have chosen otherwise. However, we all understand the psychological forces acting on a person and know they are never completely free in the decision making.

It seems to me that each model only describes its elements in terms of elements found in the day-to-day, intuitive model. For example in a Christian religious model, although one would talk about spirit, and how things are "beyond understanding", one would still have a picture of what is being talked about. In fact rather than leave things as completely mysterious Jesus is said to have taught that God is like a father - a concept his followers could relate to from their day-to-day model. And in the physicalist model, don't we still ask what caused the big bang, as we can only describe events in terms of cause and effect, as that's how we experience day-to-day life?

I discuss later the problems we have in modelling certain aspects of reality, even, as in quantum physics, where we have very precise scientific descriptions of how to make accurate and reliable predictions.

Our intuitive model of reality - how true to reality is it?

"Does natural selection favour veridical perceptions? It gives a clear answer : no"

Donald Hoffman, The Case Against Reality p60

Colour

Does our model show colour as it really is?

Consider when we look at a ripe tomato. We know that a tomato skin reflects electromagnetic radiation of the same nature as radio waves. The wavelength of the light is around 690 nanometres, whereas the wavelength of radio waves is generally from a few millimetres to a few hundreds of metres. Neither wavelength has inherent colour, they are simply disturbances in the electric field.

If we inspect the physical process happening when we are viewing a tomato, we notice that there is a nerve signal going from a cell in the retina to the brain. We see nothing more than a simple electrical impulse. There is no information saying how to decode this. The redness sensation is created after the signal has travelled along the optic nerve. Redness appears in our mind but is not at all present in the world-out-there, in objective reality.

Why the redness sensation? According to the theory of evolution it's a red sensation because it works. It could have been any other sensation, but redness worked satisfactorily so evolution stuck with it and the mechanism for producing this sensation has been passed down to subsequent generations.

There is further evidence that colour sensations exist only in the mind and not in objective reality. Sensations such as purple do not even correspond to a wavelength of light. The sensation is conjured up when both the redsensitive retina cells and blue-sensitive retina cells are excited. Similarly, white, grey and brown do not correspond to any wavelength "out there". There's a nice piece on writing on the colour purple which expands on what I have just put forward:

https://www.zmescience.com/feature-post/natural-sciences/physicsarticles/matter-and-energy/color-purple-non-spectral-feature/ In this piece, the author, Alexandru Micu, says "The thing is, while every color you perceive looks real, they're pretty much all just hallucinations of your brain." This is consistent with the statement "Our perceptions are fantasies that coincide with reality" [Frith "Making up the Mind" p. 135]

That the colours we perceive do not match objective reality has been known for centuries:

"[colours are] no more than mere names so far as the object in which we place them is concerned ... they reside only in consciousness. " - The Assayer, Galileo, 1623

To repeat the question: Does our model show colour as it really is? No. Colour in our model is not a true reflection of objective reality. It's useful but not veridical.

Size

Does our model show size as it really is?

The Moon Illusion is one of my favourite demonstrations as it's been available to human beings for thousands of years and the illusion is rather gorgeous. You'll notice that when the moon is full it appears very large when just above the horizon, certainly much larger than when it's high up in the sky. Ask a random person why this is and it's very likely they'll say it's an atmospheric effect. It turns out that's not the correct explanation and you can check this for yourself. Wait for a full moon. Moon-rise at full moon is always late afternoon or evening wherever you are in the world. Validate that the moon does indeed look beautifully large. Now take a piece of holepunched paper and view the moon at the horizon through one of the holes so that it fills the hole. Your arm will be extended but not quite fully. Then wait a few hours for the moon to climb until it appears smaller - or "normal" size. When you view it through the same hole you will find your arm extended exactly the same amount. To give this in figures, the moon's diameter when viewed from the earth's surface subtends an angle of about 30 arcminutes wherever it is in the sky.

To repeat the question on size: Does our model show size as it really is? We see from this simple demonstration that our mind's rendering of size in our model of things is, at least on some occasions, inaccurate. It doesn't render a true reflection on objective reality.

Summary

Hoffman has shown^{*} that if Darwin's theory of evolution holds, then there is zero chance that any mental model is accurate. Our mental model can be very useful, but it is certainly not a veridical representation of objective reality. I hope that the above examples provide reassurance that he is right.

^{* [}Hoffman "The Care Against Reality" p.20] "We will see in chapter four that evolution by natural selection entails a counterintuitive theorem: the probability is zero that we see reality as it is."

The intuitive model of reality - its evolution

There is a great amount of evidence to show that we humans are as we are due to the Darwinian process of evolution by random mutation and natural selection.

Let us, for this section, assume that this has been the only process in operation over our history. According to that theory, if we trace back our ancestry far enough, we descend from single-cell organisms. Let's go right back to the original ones. These organisms would obtain material and energy from their environments and would divide to reproduce.

At some point they began to respond to their environment. The cell detected a change in the environment and responded. According to evolution, the detection mechanism happened by chance, and the response mechanism happened by chance too. Most such detection-response mechanisms failed or were not heritable. Eventually one heritable detection-response pairing gave the organism an advantage over other cells, so the mechanism spread.

Darwin's theory says that for every detection, there is some form of response, otherwise there would be no competitive advantage and the detection would not be inherited.

At no point throughout evolution, has there been any indication of the nature of that element of objective reality which was detected.

All the organism needed was that the response was advantageous in light of the detection.

At some point, from an evolutionary perspective, neurons are created and a sufficiently complex network arises to allow for the sort of consciousness that we are familiar with, and qualia are developed. Evolution says that any quale is created completely through random mutation. If there is a cost to producing a quale, then evolution says that it must be useful in order to be inherited. Here I make an assumption that all qualia are costly to some extent - it takes resources to activate a quale - a sensation. To be useful it must be matched with a detection or set of detections and give rise to a response. What use would that be? The organism already has detection and response pairs, and has fared sufficiently well up to now. The answer that jumps out is that a quale must be involved in decision making. It must help the organism choose between possible responses. This is admittedly a hypothesis. I trust it is a perfectly reasonable hypothesis though, and one which we can take as an assumption for the purposes of this book. Its reasonableness is helped by it being a falsifiable hypothesis; we need only to find a single quale which could never have been used in choosing a response to a sensory detection.

I have assumed that a quale takes some resources to be created. Anything which is costly and has no use will eventually be eliminated from inheritance. I haven't formally eliminated the possibility that all qualia are simply by-products that cost nothing to produce and have no use in decision making. I would find this an extraordinary situation however, so I'm choosing to disregard it. For this work, I am making the assumption that the creation of a quale requires resources so, if evolution holds, then qualia must have usefulness.

Summary so far

The examples of colour and size show that the qualia we have can either bear no relationship to objective reality, or significantly distort objective reality, which backs up Hoffman's conclusions. According to the theory of evolution, all qualia are created randomly, so we shouldn't expect qualia to faithfully represent objective reality. What we do expect though is that they are useful, and they help us to make choices that benefit our evolutionary fitness (ability to survive, thrive and reproduce). This is consistent with Kant's view of perception and many others such as Helmholtz, Gregory and Frith.

Models of reality - using qualia

How do we use qualia that we have discovered in the previous section?

As we saw in the previous section, any quale must confer an advantage for it to be passed on to successive generations. To confer an advantage a quale must give rise to at least two responses from which the organism can choose otherwise the quale would simply be an artefact with no use, and evolution says that such artefacts are eventually removed from the gene pool. The quale is in the mind so the mind makes the choice. How can it execute that choice? It has to associate different outcomes with the possible responses it can take. Those associations are beliefs. The mind cannot know for certain that any particular outcome will follow any particular response, it simply has a belief. Since the mind links a quale with a set of responses, and responses with outcomes, it is also linking the quale with possible outcomes. All these links are beliefs.

Claim: A quale is of no use without beliefs about it.

Is this claim reasonable?

The tomato.

We see the colour of the tomato. When it is red, we have a choice of whether to eat it or not. We believe that eating it will result in a pleasurable experience and additional energy. We believe that leaving it uneaten will result in feelings of hunger and of less energy. We can confirm that the links between redness, responses and outcomes are simply beliefs, albeit beliefs with a good deal of evidence to support them.

A gunshot.

Some pressure waves impinge on our ears. The mind generates a auditory quale - a sound. The quale of sound is generated in order that the mind can make a choice. To facilitate that choice, the mind will have a number of beliefs about the sound. The responses from which the mind might choose could in this instance be: ignore, listen more intently, flee immediately or freeze. The mind will have a belief about the source of the sound which is what will inform its array of responses and outcomes.

Beliefs

I use the term 'belief' to describe a link between a set of qualia and some action, or between a set of qualia and a set of sensory data. I think that this is consistent with the colloquial use of the word.

If I say "I believe a hammer is a useful tool for driving a nail into wood", I have in mind a picture of a hammer, formed by qualia, and a possible action, and a result - a nail imbedded in wood - and this also represented in my mind by qualia.

The link between qualia and sensory data is exemplified by "the dress" [<u>https://en.wikipedia.org/wiki/The_dress</u>]. I have sensory data, and with one belief, my mind creates the qualia white and gold, and with another belief my mind creates the qualia blue and black.

If I have a belief *in* something, it's actually a whole set of beliefs about past actions and possible future actions. If I believe in hard work, it means I believe that by taking certain actions certain results will obtain, and the results are described by qualia.

When we have a collection of qualia and beliefs, then we have a model.

I suspect that any component of a mind's model of reality can be classified as either a set of qualia or a belief. I cannot substantiate this yet but I think that's not actually crucial though for the what this book has to say.

Do we use a model for perception?

Frith says so.

Do we have an unconscious model as well as a conscious model?

My answer is 'no'. The model in the conscious mind is the one which gives us the facility to make choices. If something is happening unconsciously, a model is not required. For example, my duodenum reacts to having food put in from the stomach. I see no model here but only a response mechanism. Peristalsis sets in. I don't have a sensation of peristalsis. The duodenum doesn't have to make a choice - it simply reacts. I do however have a choice when something goes wrong and I get an ache associated with that region. I have a choice when my mind manifests the quale of pain in my conscious model. Along with the quale, I have beliefs - beliefs about the possible responses available to me and the likelihood of associated outcomes.

What about the model when we are part conscious? Medics sometimes measure degrees of consciousness as Alert, Verbal, Pain and Unresponsive. We can also be asleep. When not fully conscious, the model would seem to be retained but inactive, a bit like a map stashed away ready to be used when the owner is ready to use it. How the model is stored when not in use is an interesting question, but I don't think it's pertinent to the main thesis.

Our qualia are inadequate to describe reality

I have described how organisms built up qualia through evolution. It has been through guesswork and validation. Eventually humans arrived at a set of qualia that seemed to fit the world we inhabit. We do not normally question its veracity since it seems to fit so well. However we can easily see that we could have assigned the redness quale to grass and the greenness quale to a ripe tomato and we would function just as well.

I want to convey how limited our set of qualia are, and the level of simplification in the mind's model of reality. This is important for appreciating the applications of MTP descried in section 2.

Quantum physics

Quantum physics says that a particle doesn't actually occupy a fixed location. An electron is often used as an example.

How do we do that with our existing qualia? I suggest we can't. A physicist won't try to use the mental model to make a prediction. They will use calculations based on previous investigations. Their model is no longer a mental model but one of equations. The mental model is insufficient.

Why can't we model an electron in our minds? Why is our modelling capacity insufficient?

It assumes there is such a thing a three dimensional space. We assume space exists because we are so familiar with its representation in the mind. We say "space is all around me" just as we say "grass is green". We have seen that grass is not green - it's our minds which assign it a colour. Similarly we can't know how space "is". We only know that our minds assign it the qualia of width, height and length. Our minds have guessed that the dimensions are continuous and that all matter can be assigned a place within this framework. It's simply the mind's guess, and over many millennia it has been a guess that has proved to be useful. It doesn't mean it's a correct guess though.*

The discrepancy between our mental model of space and the reality of space is even more starkly evident when looking at entangled pairs of particles. One of the pair of particles has its spin measured, and the very act of measurement causes an instantaneous change in the other particle even if the pair are separated by hundreds of metres. The issue is an example of what is known as quantum non-locality which Einstein characterised as "spooky action at a distance". It was only recently that physicists removed any doubts about quantum non-locality and as far as I can see there is not yet any conceptual explanation, we simply have to accept the experimental evidence and plug in the numbers to the equations. "Spooky action at a distance" is still a reasonable description. The important thing to note, for this book, is that it only looks spooky to us if we continue to assume the veracity of our mental model of space.

What I am saying is that our three dimensional mental model of space is made up in our minds and is probably not fit for the job of describing quantum effects. It works very well for most aspects of life, but it is nevertheless a mental fabrication. It is no more than a way of presenting the world so that we can make day-to-day decisions, but is insufficient to model some aspects of reality

Causality

The qualia we have inherited allow us only to model a world in which every event follows a cause. Even if the cause has a random element it's still a cause. Most of us are persuaded that the physical universe has the Big Bang as its cause. We are now faced with the question *what caused the Big Bang*.

^{*} Hoffman discusses this:

[&]quot;...the probability is zero that we see reality as it is. This theorem applies not just to taste, odor, and color, but also to shape, position, mass, and velocity—even to space and time."

[[]Hoffman, "The Case Against Reality", p. 20]

If a cause is found, then we will ask what caused *that* cause. Even if we posit God as a cause, we are free to ask what caused God? We are seeking a "first cause" and we don't find one that fits our day to day understanding. We can posit an 'uncaused cause', but we don't have the qualia to model such a concept. Yet clearly we are here. Clearly there is a problem with the concept of a *first cause*. We can deduce that our qualia are inadequate in modelling the process of the creation of the universe. It's not that it didn't happen, it's that cause and effect, in the way we intuit, do not adequately model reality.

It's not surprising though that we expect causality to hold. Darwinian evolution says that our modelling ability only exists in order to predict. We can only predict if we assume causality, so causality is absolutely baked in to the foundations of our modelling process.

How perception works according to MTP

Regarding human vision, Chris Frith writes

"When we perceive something, we actually start on the inside: a prior belief, which is a model of the world in which there are objects in certain positions in space. Using this model, my brain can predict what signals my eyes and ears should be receiving. These predictions are compared with the actual signals and, of course, there will be errors. My brain welcomes these errors. These errors teach my brain to perceive. The existence of the errors tells my brain that its model of the world is not good enough. The nature of the errors tells the brain how to make a better model of the world. And so we go round the loop again and again until the errors are too small to worry about. Usually only a few cycles of the loop are sufficient, which might take a brain only 100 milliseconds."

(Frith, Chris. Making up the Mind (pp. 126-127). Wiley.)

Rather than the senses telling me what to include in my model, I have to guess at a model using my prior knowledge about the likely situation. I then gather data to check whether the model is reasonable. With visual models, the process can include me moving my eyes a little and predicting what my eyes should be telling me. If the prediction is reasonable then I keep the model, otherwise I guess an adjustment to the model make a new prediction and check whether the sensory data matches. Eventually I achieve a model which seems adequate for the situation I'm in.

Going outside the realm of pure vision, I'll illustrate the process with another scenario. While reading this, notice that it works for all human perception, and for perception by any other conscious organism.

Biting into a tomato.

I have a model, not only of the tomato statically in front of me, but also of the taste that I would experience should I take the action of biting into it. If, when I bite into it, I find its taste matches my prediction, then no adjustment to my model is necessary apart from its normal development over time. If however I bite and it's rancid, what happens? The environment doesn't tell me it's rancid. What happens is that as I bite, my mind is monitoring sensory signals, primarily checking that they are as predicted. It expects a signal consistent with its model of sweetness. If instead it doesn't get that then it asks "Is it sufficiently different to merit an investigation?" If it decided "Yes", then my mind must propose a new model and check whether sensory data matches the model. It has experience of rancid tomatoes, so that is the first model it suggests and it may find that it does indeed match the data. My mind thus has a model that I've just bitten into a rancid tomato which facilitates a choice of actions with their predictions of consequences:

- continue eating and suffer a stomach ache
- spit it out and avoid stomach ache but lose the satiation

If however someone had injected the tomato with a mint flavour, my mind would probably first create the model of a rancid tomato, then test it against the sensory data. This time it finds it doesn't match. It then tries new models until it finds one which does match the sensory data. This might take a while as it is resistant to proposing the mint model as it is so unexpected.

As we can see, the model really is a most fundamental part of perception.

The key guesses. The choices.

"We do not know, we can only guess" - Karl Popper, The Logic of Scientific Discovery, Routledge 2005, p. 278

The basis

The mind creates models which include how it expects reports from the senses. If the sensory data is outside of the expected values, the mind postulates new models, which include both representations via sets of qualia and beliefs linking them to expectations of sensory data, and it then tests them against actual sensory data until it finds a model which matches.

It does not build a model from the sensory data.

Basic Implications

- We like to think that we gather the evidence *before* coming to a judgement, but that's simply not the way we work. We *always* make a judgement first and only then gather evidence. We can, by all means, apply Jesus's dictum from the Sermon on the Mount "Judge not, lest you be judged", but only if we allow ourselves to interpret this as "Judge not harshly" or "Condemn not".
- There is no way to deduce the correct model of reality from evidence. The only option available to us is to model reality's behaviour and that we do by guessing a model, predicting how sensory data should be, and then verifying the model by checking that prediction against actual sensory data.

• The way we see the world heavily depends on the guesses we make about it. If we guess a model A and the sensory data fits A reasonably, we will stick with A. If we had chosen model B and the sensory data fitted B, we would have stuck with model B.

In every conscious model, there is a sequence:

- Hypothesise/guess at a model
- Predict what will be sensed from reality
- Notice a discrepancy between what is predicted and what is sensed
- Make a guess as to what update to the mind's model might give rise to this sensory data the hypothesis
- Develop a strategy for obtaining evidence to validate or invalidate the hypothesis
- Gather such evidence
- Evaluate the evidence
- Ask "Does the evidence support the hypothesis adequately?"
 - Yes: Go back to the third step and be awake for discrepancies
 - No: Hypothesise/guess at a replacement model and go back to the top

Let's see how there play out in example situations

An example in vision

Let's imagine you are walking along under a blue sky. A small white object appears in the sky. Your mind was predicting blue from horizon to horizon. Actual sensory information is now different from predicted sensory information and it's sufficiently large and long lasting for your mind to not simply disregard it as noise, but it's still small. Your mind can't simply represent the whiteness as a pixel. What you are perceiving is not a picture, it's a model. Again, your mind can't simply represent the whiteness as a pixel, as your mind doesn't believe that pixels exist in the sky so your mind won't add a pixel to its model. Clouds can exist in the model, so can birds and so can aeroplanes. Your mind chooses one to represent the whiteness and then searches for further evidence to back up its guess. Is the dot fluffy? Is it moving? Are there contrails? The point is that your mind's rendition of the sky is not simply a picture, it's a model. Yes it has colour but it also has substance - air which can move - and it has a temperature and it has the ability to contain things, things which float in it and things which fly.

An example in a social situation

The phone rings, it's an unknown number, and when I answer it there is a voice shouting unintelligibly at me.

In the sequence, let's go from when I answer the call. My expectation is that someone will announce themselves quite calmly and clearly because that is what usually happens to me. Instead, there is a voice shouting, so I have a discrepancy. My mind makes a guess at what is giving rise to this. It could choose from, among others:

- Prank call
- Someone I love in trouble and using someone else's phone to call me
- Someone annoyed with me
- Someone annoyed but a wrong number

The seemingly mature guess of "I'll hold off judgement until I've found out more information" is not a valid hypothesis and can't be modelled. The mind is compelled to choose an actual plausible scenario. Once it has chosen a hypothesis it then develops a strategy for validating it and substituting fresh hypotheses until a reasonable one is finalised from which point the conversation continues. Ideally this would involve calm enquiry. However, it is easy to fail to validate properly. Thus I might hypothesise the first option "it's a prank call" and think I have sufficient evidence through the tone of voice. If however, the reality of the situation was the second scenario, the words I would then use would cause additional distress to the person in trouble.

We learn very early on in life to obtain reasonably good validation for updating our visual model. The cost of an inaccurate model is noticeable and immediate. Our social models however often don't give us such unavoidable feedback, so we do find it easier to rush to inappropriate conclusions.

An example about a world view

Nicolaus sees the Sun rise to the east of his home and sees it set daily to the west often in glorious sunsets. His world view is that the Sun goes around the Earth. This world view is his model. From this model he makes a prediction that the Sun will rise again in the east around twenty-four hours after it rose today. His senses report that this prediction is reliable, so he has no reason to change this model. It is only when he tries to place the planet Jupiter in his model, and have it go around the Earth that he runs into prediction problems. With a stroke of genius he hypothesises that the Earth is not actually the centre of the universe, but the Sun is. He develops a strategy for gathering evidence, which involves some straightforward calculations and observations, and finds that there is a good match between his predictions and the observations he makes with his senses. He therefore updates his model, or world view to have the Sun at the centre of the known universe.

In the above, we can see that we:

- 1. Make a good guess.
- 2. Choose a strategy for seeking evidence
- 3. Gather evidence and evaluate it
- 4. Decided whether the model is good enough

These are all creative steps. I can present no source for such creativity, but simply state that creativity is required.

I further characterise these steps as

- Create a hypothesis (from step 1)
- Perform experiments to validate or invalidate the hypothesis (steps 2 and 3)
- Check Return on Investment (ROI)

ROI

When we have a model, there is a tendency not to want to change it. There is value in maintaining a model. If we were to change our model frequently, we wouldn't be able to make predictions, and predictions are precisely why evolution has furnished us with perceptual models.

There has therefore to be a good reason to change any mental model. I propose that we do a calculation of ROI - *Return On Investment* - before undertaking the hypothesis and experiment steps to update the model.

Improving our model

Why should we care?

In this section I am only going to be considering social models and worldview models. This is where I believe the greatest value from MTP will be.

There can be a cost in having a poor model

A few examples:

If our model fails to identify a predator then we can very quickly lose our ability to pass on our genes, so evolution has sharpened this modelling facility.

Another modelling requirement is whether another human being intends us harm. We are a social species and need the co-operation of others, but there are also some who take advantage of others and in the process do them harm. We therefore model the intentions of other human beings towards us.

Getting this model wrong, by assuming poor intent, has led to the dehumanising of whole classes of people resulting in what we now call genocide. By incorrectly modelling good intent, people have found themselves victims of internet scams.

There are other social models with less dramatic costs, but important nevertheless.

Fred might update his model of Jo's intent when he doesn't receive a Christmas card from her, or if she doesn't meet him according to an arrangement they've made. Their future relationship will be affected by what he believes.

In depression, the sufferer may have a model that they are a failure at life and that the future is never going to improve. We know this is only a model. Those of us who have experienced depression know it's an invalid model, and that it's the maintaining of this model which is a large factor in maintaining our depression.

Having an invalid worldview can also be costly. If George's model is that his religion is absolutely correct, and that he must spend hours each day at Hyde Park Corner trying to convince others, there is a cost to his social life. If his model turns out to be correct, then his neighbour, Ingrid, who is spending similar energy trying to convince others of a different religion, has a cost to her social life.

A worldview which says that no one can really be trusted is costly in that we have to spend energy in creating what are effectively contracts with everyone we interact with.

There are however some models where there doesn't seem to be a cost to incorrectness. We have already seen that we all incorrectly gauge the size of the full moon, yet there doesn't seem to be a cost here. In fact, if one were watching a moon-rise with one's beloved, there might be an increased romantic atmosphere – a possible advantage. If our perception were to make a predator appear larger than a similar sized inanimate object, it would be incorrect, but could also give us an advantage. So unfortunately we cannot state a generalised rule about the cost of measurably inaccurate models, only that there are sometimes costs.

A generalised statement that may apply is that any model has a *domain* where it can be considered valid, and relying on the model only causes problems outside of that domain. Newtonian mechanics is a model connecting masses, forces, acceleration and gravity with fairly simple laws. Outside of its domain we need to use relativistic mechanics. We can send people to the moon using Newtonian mechanics so its domain is quite far reaching.

The person above with depression has a model which includes their being a failure at life. When they are making a cup of tea in their own kitchen, this inaccuracy doesn't matter - it creates no appreciable costs. However, their model's domain is quite small, and outside of that, there are significant costs

to relying on this model.

In practical terms it seems that it is worth looking into improving a model when we become aware of the cost.

To improve the model, we improve the steps we take

We improve:

- hypothesising a model
- the experiments we perform to validate the model
- the ROI calculation

Improving our hypotheses - making better guesses

The production of a model to hypothesise seems to require invention by the organism. It seems to be a product of consciousness. It is conceivable that there is an element of choice and agency here, or perhaps our consciousness has a list of possible guesses from which it chooses at random. Perhaps a guess is sometimes bestowed on us from outside what we imagine to be our mind.

I used a quote from Karl Popper to head a previous chapter. Expanded it says "We do not know: we can only guess. And our guesses are guided by the unscientific, the metaphysical (though biologically explicable) faith in laws, in regularities which we can uncover—discover. " Popper claimed there was a biological explanation, though in the remaining four pages of his book he fails to offer one.

For now I trust that it is sufficient to state that a guess is made and that we do not know the mechanism for the creation of the guesses.

When we find that our model may be wrong, and that the discrepancy is

sufficiently costly, perhaps in terms of generating pain or anxiety, then we will need to come up with new hypotheses.

This is where we find the practical value of this book, and I'm afraid all I have to offer is a list of various traditionally used sources for fresh hypotheses, not all of which I endorse and which are not in any order of importance.

- Asking a friend
- Asking someone with a view known to be in conflict with ours
- Asking someone of a younger or older generation
- Sleeping on it
- A spiritual practice for example prayer or meditation
- Drugs, both legal and illegal
- A walk in nature
- Academic resources such as a lecture or a book
- An expert in the field of concern

Note that there doesn't seem to be a prescriptive method for obtaining a good candidate hypothesis. My guess is that the more hypotheses the better and the more varied the better.

Improving our experiments

We can come up with better strategies for gathering evidence and we get better at evaluating the resulting evidence. Below are examples of poor experiments:

- We will often seek evidence of the crimes committed by the enemy, and ignore those created by our side.
- Joe has a sense that he might be unattractive. This is simply his hypothesis. He wants to test it. He doesn't want to ask outright and have his hypothesis confirmed as true by a friend, so he tests it in a small way. He attempts a relationship, but as he believes he might be unattractive he is very tentative. The object of his affection interprets this as a lack of commitment or passion and rejects him. Unfortunately Joe now has evidence which he interprets as supporting his hypothesis.

As with hypotheses, I can see no general formula for how to improve experiments. We should at least examine whether we are performing the appropriate experiment and evaluating the gathered evidence well. I will describe some possible steps in section 2.

ROI

We can adopt two extremes:

- being ready to make the smallest change in the model and being hypervigilant for it not being right
- being unwilling to make any change to our model

I imagine that neither is healthy. Whether there is a sweet-spot to aim for I don't know. My supposition is that being good at calculating a ROI is probably the result of conscious practice.

As for experiments, I give below an example of a poor ROI calculation:

• We often get a *gut feeling* that something about our model is wrong. Perhaps I am late delivering some work. I had convinced myself yesterday that it didn't matter, yet on my way to deliver, my churning stomach alerts me to the possibility of a different model that it *does* matter. That churning was actually there yesterday, but I chose not to pay attention to it. In terms of the MTP process, yesterday's churning was evidence that my model was incorrect, and I chose to ignore it.

Free choices

In MTP, I have now identified four places where there is a requirement for choices to be made:

- ROI is it worth reviewing my model?
- Hypothesis how could reality be different from my existing prediction?
- What strategy shall I have for gathering evidence?
- Does the gathered evidence support or refute the hypothesis

How are these choices made? To what level is an active choice involved, and how much is automatic? Do we get libertarian free choices in all four places identified above?

I suggest that it might be impractical to fully answer these questions but, having confidence and understanding that this is the process, we can look at possible improvements to each of the steps. I do this in section 2 where I consider various scenarios where MTP might have value.

Section 2

In this section I look at the implication of MTP in some areas where it can usefully be applied.

These won't perhaps be be new ideas. but previously we may have relied more on limited evidence or simple hunches. If we can trust MTP and see how it underpins the application, it might make the approach more attractive to some people, or allow them to undertake a course of action with more enthusiasm.

Depression

Depression can often be treated with Cognitive Behavioural Therapy (CBT) so long as the person is sufficiently well to be able to engage with a therapist leading CBT sessions.

CBT is a method for challenging one's models of oneself, of others and of life in general.

An understanding of MTP, that we all have mental models and that everyone's mental model is inaccurate, incomplete and resulting entirely from guesses, may help a depressed person accept their state more readily. They may accept that it's worth trying out new hypotheses if they know that their current model is only a guess. They may also see that they have accepted unhelpful hypotheses simply because they haven't done appropriate experiments, and that better experiments could refute them.

Consider a person with depression or another psychological disorder who is highly functioning. They may be unwilling to seek treatment. If they are presented with MTP, and shown that everyone's model of reality is faulty, without exception, then they might be more willing to explore other mental models.

My memory of my own experience of depression is that I thought others had 'got life sorted', and that I was in a very small minority of people who had misunderstood life in some fundamental way. This view put a considerable barrier in the way of my recovery. Through MTP I now know that no one has 'got life sorted' and that we are all quite literally muddling through. This has allowed me to be a lot easier on myself and my past choices.

Relationships

Suppose there is a relationship between person A and person B. If the aim is to have person B adopt another, healthier model, B has to take a leap of faith that the new model is worth considering. B may have inferred or been told over many years that such a model is invalid. Not only will B have to adopt a model that they had rejected, they will also have to accept that they were wrong and have caused upset. As a result of this acceptance task, they may end up with the belief that they must have been stupid for many years rather that the healthier belief that they had simply had got it wrong like all humans do. The unhealthy belief of being stupid can lead to additional problems, and may allow the original model to return, with the result that B ends up worse than before any intervention.

In addition to having person B learn about MTP, a successful outcome is more likely if A appreciates the nature of the tasks B has to take on, and provides conditions where B's new and healthier models and beliefs can be more likely to take hold.

It might be useful to have both B and A work on updating models which are less serious than that causing the original issue, so B gets used to the idea that all models are wrong to a degree, and B also sees that A has incorrect models too and is prepared to put in work. There is also value in group work, in internalising that all people have incorrect models and there is no shame in putting in the work to update such models.

Forgiving

For this section, I will use the definition I was taught on a course on forgiveness.

"Forgiveness is the refusal to hold ill will against someone for what they did or didn't do"

[Dr K B Brown - Life Training Course, now More To Life]

The short version is "giving up resentment"

When I am unforgiving of a person, I am holding a model in which I would have behaved better than them given the same circumstances. I hold onto that model, and actively avoid seeking evidence and examining it. I do this because I am enjoying the supposed benefits such as collusion from some well-meaning, but ultimately misguided, friends.

If I do seek evidence and examine it carefully, I will find that I have few grounds for my hypothesis that the perpetrator deserves continued condemnation and chastisement. I will also find that holding this demonstrably inaccurate model is indeed costly. Furthermore it is generally found that maintaining the model (holding onto resentment) is more costly to me than to the person I am choosing not to forgive.

Atheism and theism

It's a seductive idea that one can base ones world-view on hard facts, and that those 'of faith' are the ones believing in something, perhaps to have as a crutch to make life more bearable or so that they don't have to take responsibility for creating meaning.

Some with a religious or spiritual leaning do claim certainty, and without credible evidence that can be off-putting to anyone who wants to explore any form of non-materialistic reality.

What I hope I've shown in section 1 is that all world-views are based on assumptions. A materialist view is based on faith just as much as a view that explicitly admits its spiritual faith.

It's tempting to say that atheism is the default view, and that it's the theists who need to present evidence for their point of view.

This is certainly the view I took for many years, so I write from experience.

What I suggest in this book is that we can apply the MTP steps to either world view.

First apply the ROI step.

Is it worth my while questioning my worldview, whether it be theism or atheism?

If one is donating money to a religious group, or one is spending time decrying a religion, then one is likely to answer this affirmatively.

Now state the worldview clearly and precisely, so it becomes a hypothesis worthy of being tested.

The atheist might propose:

The universe came into being in the Big Bang. Science discovered the Big

Bang and will in time discover its cause. Consciousness is produced by physical objects in the universe such as neurons, or is a primitive quality attached to fundamental particles in the universe.

The Christian might propose:

The universe was created by God who used Darwinian Evolution to create human beings which have an amount of free will. Human beings are primarily spiritual beings. God is as described by Jesus Christ in the gospels of the bible. Following the teachings of Jesus is paramount.

Now devise a strategy to gather data to support or contradict the hypothesis one has chosen.

Either might test their own hypothesis, and might also profitably test the hypothesis of the other.

Both would benefit from a good understanding of Darwinian Evolution and the fact that the eye, for instance, has a straightforward explanation in that paradigm.

Both would benefit from an understanding of the limits of Darwinian Evolution. It can only start once the mechanism for cell replication is in place. Animations of helicase (available on YouTube) may not prove anything, but they are awe-inspiring whichever view one adopts.

An experimenter will never got proof of one view or another. If it's an important question for you then the most you can do is to pose a good hypothesis and perform good quality unbiased experiments.

An experimenter must set out in good faith, so gathering data on Christianity could involve establishing whether Jesus's teachings are sound. It's not sufficient to say, for instance, "loving one's enemy makes no sense", one must try some of his teaching and evaluate the evidence. Forgiveness is a good starting point. One could try it and see whether life improves. There doesn't seem to be a downside to such an investigation. Some claims of Jesus are not really open to experiment, such as those about life after death. In that case, simply pass by that claim, and focus on the parts which are amenable to experiment.

Some claims of both atheism and Christianity are not open to experiment, such as the ultimate source of the universe. In one, we have to account for the Big Bang, and in the other we have to account for the origin of God. We can, however, focus on what we can get data for.

If your worldview involves the existence of libertarian free will, as is the case with most Christians, you might examine how this might be accounted for. If it involves the absence of libertarian free will, which is the position of atheists who base their atheism on physicalism, then you could examine how you can be confident that your data gathering strategies are adequate in the absence of free will and that your evaluations of the resulting data are similarly sound.

If your worldview involves consciousness as a property within space-time, you might examine whether you need to modify your view in the light of up to date scientific evidence presented in this book, and if your worldview involves humans being made in the image of God, then you could examine what that might mean in the light of similar evidence.

Many of us have a worldview rooted in physicalism, as it's the one favoured by evolution. Although it may be a natural worldview, it is, as we have seen, not one that is borne out by science. If one sticks with this natural worldview, there's a tendency to want to explain things in terms of physical elements, but if one does, it's quite a leap to believe in a divinity. If, however, we accept that physicalism is simply a model that works for a limited domain, and is certainly not a good basis for actual objective reality, then exploring what might be called *spiritual* elements becomes simply one reasonable hypothesis among others.

Personal development practices

It is a happy outcome of my investigations for this book, that the course which has given me the greatest results in life is also highly correlated with the findings of MTP. The practices in the course however were arrived at through a different route - mainly through a psychotherapy practice.

The courses are provided by the More to Life organisation, and I'll show how some of the practices in the flagship course "The Weekend" correlate with MTP.

My own characterisation of one of the sequence of processes is that first I have to notice that the model I am using is at odds with my experience of reality. In the course, this experience of discord is called a life-shock, and in other similar disciplines the term trigger is used. It can be as simple as some whiteness appearing in an otherwise blue sky or an unexpected taste when biting into a tomato, as I described in previous chapters, or it can be receiving unexpected news in a letter, slipping on the kitchen floor or hearing a gunshot. It can also be a gradual build-up of anxiety, perhaps linked with a sense that I should follow a particular course of action such as repairing a gutter.

Sometimes, like with the white in the blue sky, the mind handles the situation brilliantly with no fuss. Quite often though, the mind can make up a more dramatic story or model about the situation. Included in the model may be the notion that I am stupid for slipping on that floor, or that I am a bad person for not having already attended to that gutter.

More to Life provides a series of steps for uncovering these dramatic models, and then for challenging them with data we already have access to. So in this case *the strategy* for getting evidence is already chosen - it is to become aware of the 'self-talk' that we experience and write it down. We write until we uncover beliefs (parts of the model) which we sense would be applied more generally. We find that these beliefs crop up regularly, perhaps in certain situations such as when we are stressed. We then examine

the self-talk statements that we have written using as much objectivity as we can and see which statements we have reasonable evidence for and which seem to be made up, and perhaps made up many years ago. Once we see these beliefs on paper, which are now seen to be without substance, we can disown them. At this point we can propose a more helpful model with beliefs that are more in line with reality. There is no mechanical process for this step of discovering a more helpful model. It is my experience though that new models, some of which are quite unexpected, do come to mind once the old model is dispensed with. Just as in MTP, there are steps which are simply free-choice, with no mechanical method.

The next step is to test out the new model. More to Life says to take some concrete actions which depend on the new model so we can see that it is indeed valid, and so that the mind is more likely to work with this new model rather than the previous habitual and dramatic one. We find that although we have just discovered it's false the mind can still adopt the old model as it's so used to it. After many years of familiarity with the old, the mind needs convincing that the new model is reliable.

There are a three other processes that More to Life offers in its flagship course. Two are connected with forgiveness, which is a repudiation of the model where I supposedly derive benefit from continuing to hold ill will towards someone for something they did or omitted to do. In one process, the *someone* is another person or organisation, in another process the *someone* is myself. The remaining process uses physiology to remind ourselves to adopt a more authoritative model.

I know there are other personal development courses available. I describe the flagship course of the More to Life organisation as that's the one I'm familiar with, and because I know it to be highly consistent with MTP.

Limitations and implications of physicalism

My hunch is that this sub-section has less immediate practical value that the others in section 2, but I include it for the sake of completeness.

Physicalism effectively holds that everything in reality is contained in space-time. It says that there is a universe, or multiverse, containing space which then contains physical stuff such as fields, energy and matter with various properties. It also says that consciousness is generated in some way from this physical stuff. In particular it says that consciousness is caused by the brain, by neural activity.

It is a very popular world view. It is the world view I had for many decades, and one which I never thought to question as it seemed consistent with science, and with all my day to day experiences.

Physicalism has a very good explanation for life. It emerged through evolution. It is such a good explanation that it's reasonable to assume that if physicalism holds, then so too does Darwinian Evolution.

We have seen that if evolution holds then the organism's mind represents objective reality through random representations so long as the representations help the organism to thrive and reproduce. Evolution could have created any qualia, and any beliefs and thus any models so long as they helped the organism thrive.

Evolution says that we will have modelled just those elements of reality that help us survive, thrive and reproduce and no more.

It seems that for humans, being able to model foods containing energy and to model dangerous animals is particularly beneficial. To be able to model the moon's size accurately is not so necessary. We also know that we don't have the qualia to model what's going on at the nanometre scale where quantum effects dominate. We can develop formulae which model quantum mechanics but we don't have the qualia to represent this in our minds. At this stage we are able to say that *if physicalism holds* then:

- We will always only ever have access to a simplified model of reality, not direct knowledge of reality
- The model is inadequate to explain all of reality
 - The model is always built on guesses which have zero chance of being an accurate representation of reality
- The reality giving rise to the behaviours could be anything, and is certain to be very unlike the physical stuff we believe is out there.

Free will

There's another surprising implication of physicalism. If Darwinian evolution holds, and some level of resources of required to manifest and quale then I showed that any quale must facilitate a choice. That choice cannot be merely mechanical, if it were then there would be no need for the quale and evolution says it would not be replicated. The choice has to be one that only our conscious mind can make. This seems to imply that the mind is required to have agency, and agency implies free will in its strongest sense - libertarian free will. This is interesting as, as far as I'm aware, most physicalists hold that free will, of the type implied by agency, cannot exist due to the seeming impossibility of a conceivable mechanism. I agree with them. If physicalism holds, then there can be no such mechanism. Thus to me physicalism seems to imply a contradiction: if physicalism holds and qualia take resources to be manifested, then libertarian free will exists, yet libertarian free will is impossible in a physicalist world due to the impossibility of a suitable mechanism.

A poor candidate for reality

We also have that physicalism has made no progress in showing how consciousness is produced from physical stuff, yet we are all aware that consciousness exists.

In summary, physicalism is a poor candidate for the explanation of reality. There are authors who explain this very well. Some go on to postulate how reality is and what consciousness is. I want to simply state however that physicalism should not be taken as an objective position.

If not physicalism, then what?

I don't know how reality is but I can make some strong statements about how I find it.

- Consciousness exists
- There is strong evidence for evolution in the way Darwin described
- Darwin does not describe the mechanism for the emergence of the first cells that is still being researched.
- There is a world separate from my consciousness which I can affect and experience and in which other conscious minds exist. (I simply have hope that this is the case. If you are reading this, then I am correct!)
- Physicalism is an unsatisfactory description of reality. What the intuitive model says is real, is only our minds' collection of guesses as to what is actually in objective reality. Therefore what we intuitively think of as the brain is only a model and a model can't give rise to anything. In particular it can't give rise to consciousness. The activity that we see in this model is certainly strongly correlated with conscious experiences, and it is reasonable to conjecture that whatever it is that is being modelled as a brain may also have behaviour which is correlated with conscious experiences. There is no evidence however that one causes the other.

Finishing for now

I hope I have been able to present MTP in an accessible and reasonably thorough way. There are many counter-intuitive concepts to accept. I have had many years to come to terms with them and yet I still have to remind myself these models of reality are well-founded and more correct than the intuitive model I adopted as a child.

There may be value imply in the philosophy behind MTP. I am more excited however by the new opportunities it affords to ordinary people in breaking free of limiting beliefs and models, thereby offering more joy and vivacity in this precious and amazing experience of life.

If I am right, then this subject deserves more input than that which my one aging mind can offer, so it is my hope that I will find collaborators and soon be able to follow this slim book with something of more substance.

Please do add your comments to the site where you will find an electronic version - <u>https://www.dotheexperiment.com/</u>

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