



Coghill, George M. (2023) *A critical analysis of Donald M. MacKay's contribution to theology and science*. MTh(R) thesis.

<https://theses.gla.ac.uk/83918/>

Copyright and moral rights for this work are retained by the author

A copy can be downloaded for personal non-commercial research or study, without prior permission or charge

This work cannot be reproduced or quoted extensively from without first obtaining permission from the author

The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the author

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given

Enlighten: Theses

<https://theses.gla.ac.uk/>  
[research-enlighten@glasgow.ac.uk](mailto:research-enlighten@glasgow.ac.uk)

# A Critical Analysis of Donald M. MacKay's Contribution to Theology and Science.

George M. Coghill,  
B.Sc.(Eng), M.Sc.(Med.Sci), Ph.D., LTCL



A Thesis Submitted in fulfilment of the Degree of Master of Theology by Research  
at the University of Glasgow in partnership with Edinburgh Theological Seminary.

2023.

## Abstract

In this dissertation I present a critical analysis of some of the philosophical and theological ideas of Donald M. MacKay. (1922 – 1987). MacKay was a Scottish scientist who made significant contributions across a range of scientific fields (information theory, artificial intelligence, and neuroscience), as well as to the discipline of theology and science. His main contributions that I explore are *Complementarity* and *Logical Indeterminism*, both of which highlight the importance of *standpoint* for what one says about a subject.

Complementarity identifies two, or more, descriptions of a common referent as each being complete and exhaustive with respect to their own language, but saying nothing about the other. MacKay described two types of complementarity. The first is *non-hierarchical*, an example of which is the projection of all the points of a three dimensional object onto two, or more, two dimensional planes: the points on the planes are in a complementarity relation to each other. The other is *hierarchical*, examples of which are the physical and informational descriptions of a communicated message (the sign and the things signified) and also the relation between the non-hierarchical descriptions and the original object. He used this, amongst other things, to suggest a relation between scientific and theological perspectives; but also, as he moved into neuroscience, to argue for a non-dualist approach to the mind-body problem (which he termed “duality without dualism”). It turns out that hierarchical complementarity, as MacKay presents it, has the same basic definition as *supervenience*. However, I argue that hierarchical complementarity can be revised to make it a more general relation that is better suited than supervenience to issues of religion and science, particularly free will and determinism.

The other of MacKay’s main contributions was to propose a solution to the problem of free will and determinism. He called this *Logical Indeterminism*. Here MacKay supposes, for the sake of argument, that hard determinism holds. He posits a thought experiment in which one can use a instrument, which he calls a “cerebroscope”, to view every detail of a brain and it’s behaviour. It turns out that in such a world it would be possible for an external observer to identify a complete specification of the brain state, but for the

owner of the brain this specification would not exist. From this he argues that a “super-scientist” could, from their standpoint, use the observation of brain state (also making use of the complementarity of brain and mind) to predict what the observed agent would do in their immediate future. However, because that observed brain state does not exist for the cognitive agent whose brain is being observed, the predicted behaviour does not have a “claim to their assent” until after they have made up their minds what they are going to do. As such the future remains open for them, and so they are free in a very real sense. In my analysis of MacKay’s argument I find that in its current form it is guilty of the modal fallacy. However, by making it more explicitly modal this issue can be overcome such that it then achieves what MacKay claimed for it. MacKay also suggested that Logical Indeterminism entails that the Godhead must be multi-personal. This was with respect to the economic Trinity. I suggest that the modal version entails that the Godhead must be ontologically multi-personal in a manner that fits with classical Christian theism.

# Acknowledgements

There are several people to whom I owe a debt of gratitude for their help and guidance at various stages during this research project. First, I thank the staff of ETS for creating a warm and friendly working environment.

For various reasons, there have been a number of people involved with the supervision of this project. In temporal order: first I would like to thank Dr Bryson Arthur for agreeing to supervise the project and for several useful conversations at the start. I am sorry that he had to withdraw due to ill health, and wish him a full recovery. I would also like to thank my Glasgow University supervisor, Dr Jonathan Birch for his consistent support and guidance throughout. Dr Alistair Wilson stepped in to supervise when Bryson had to stop and I am most grateful to him for his insightful directing, when this is not his area of expertise. Finally I would like to thank Dr Cory Brock for taking on the supervision at this stage, the most onerous part with a dissertation to read.

There are a number of people who have helped and encouraged me in this task, and to them I express my grateful thanks. First there was Donald MacKay's (late) sister Elizabeth and her husband Rev Bill Graham. From them I received hospitality, and early insights into MacKay's life and work (as well as copies of the tapes of his Gifford Lectures). Second, I would like to thank Prof Malcolm Jeeves for giving of his time to share his memories of Donald MacKay with me, and for his hospitality in St Andrew's. Finally, I express my thanks to Donald MacKay's widow, Dr Valerie MacKay, for her help and encouragement over several telephone conversations and email exchanges, and in particular for granting me access to her unpublished biography.

Above all on this earth, I thank my darling wife Sarah for all her love and support during this research and beyond. But most of all I thank him who has, throughout my life, led me in a way I did not know. (Isa 42: 15)

# Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Introduction</b>                             | <b>1</b>  |
| 1.1      | Motivation . . . . .                            | 2         |
| 1.2      | Outline of the Argument . . . . .               | 3         |
| 1.3      | Structure of the Dissertation . . . . .         | 6         |
| <b>2</b> | <b>Donald MacCrimmon MacKay</b>                 |           |
|          | <b>(1922 – 1987)</b>                            | <b>7</b>  |
| 2.1      | Early Years . . . . .                           | 8         |
| 2.2      | Young Researcher and Academic . . . . .         | 10        |
| 2.3      | Professor and Later Years . . . . .             | 15        |
| 2.4      | Concluding Comments . . . . .                   | 17        |
| <b>3</b> | <b>Complementarity (Comprehensive Realism)</b>  | <b>20</b> |
| 3.1      | Definition and Description . . . . .            | 21        |
| 3.1.1    | A Distinction that makes a Difference . . . . . | 23        |
| 3.2      | Nonhierarchic complementarity . . . . .         | 24        |
| 3.3      | Hierarchic complementarity . . . . .            | 25        |
| 3.3.1    | Nothing-buttery . . . . .                       | 29        |
| 3.4      | Supervenience . . . . .                         | 30        |
| 3.5      | Theological Considerations . . . . .            | 33        |
| 3.5.1    | Creation . . . . .                              | 33        |
| 3.5.2    | Providence . . . . .                            | 36        |
| 3.6      | Criticisms . . . . .                            | 39        |
| <b>4</b> | <b>Determinism and Free will</b>                | <b>43</b> |

|          |  |            |
|----------|--|------------|
| 4.1      | The Consequence Argument . . . . .     | 45         |
| 4.2      | Compatibilist Responses . . . . .      | 47         |
| 4.3      | Frankfurt Style Cases (FSCs) . . . . . | 51         |
| 4.4      | Compatibilist-Libertarianism . . . . . | 54         |
| 4.4.1    | Criticism of the argument . . . . .    | 59         |
| 4.5      | Theological Approaches . . . . .       | 60         |
| <b>5</b> | <b>Logical Indeterminism</b>           | <b>62</b>  |
| 5.1      | Outline of MacKay's Argument . . . . . | 64         |
| 5.1.1    | The Basic Argument . . . . .           | 65         |
| 5.1.2    | Dealing with 'Compensation' . . . . .  | 72         |
| 5.2      | Criticism and Defense . . . . .        | 74         |
| 5.3      | A Further Criticism . . . . .          | 80         |
| 5.4      | A Proposed Solution . . . . .          | 85         |
| 5.5      | Predestination . . . . .               | 87         |
| <b>6</b> | <b>Agents in Dialogue</b>              | <b>91</b>  |
| 6.1      | Coupled Agents . . . . .               | 92         |
| 6.2      | Prophecy . . . . .                     | 94         |
| 6.3      | The Ontological Trinity . . . . .      | 97         |
| <b>7</b> | <b>Conclusion</b>                      | <b>103</b> |

# List of Tables

|     |   |    |
|-----|---|----|
| 3.1 | The I-story and the brain story (O-story), from ‘Behind the Eye’ p 3. . . . | 28 |
| 4.1 | van Inwagen’s Consequence Argument . . . . .                                | 47 |
| 5.1 | The I-story and the brain story (O-story), from ‘Behind the Eye’ p 195. . . | 68 |

# List of Figures

|     |  |     |
|-----|--|-----|
| 4.1 | World histories at the physical level . . . . .          | 57  |
| 4.2 | World histories at the agential level . . . . .          | 57  |
| 5.1 | The Cognitive Mechanism . . . . .                        | 67  |
| 5.2 | The Cerebroscope Experiment . . . . .                    | 68  |
| 5.3 | The Observer (Super-Scientist) and the Subject . . . . . | 70  |
| 6.1 | Agents in Dialogue . . . . .                             | 93  |
| 6.2 | The Outside Observer . . . . .                           | 94  |
| 6.3 | A Trinitarian Model . . . . .                            | 100 |

# List of Symbols

- $\&$  ... Conjunction, logical And.
- $+$  ... Disjunction, logical inclusive Or.
- $\neg$  ... Negation, logical Not.
- $\supset$  ... Material implication, “If ... Then ...”.
- $\Box$  ... Necessity operator, “It is necessary that ...”, or “It is necessarily the case that ...”.
- $\Diamond$  ... Possibility operator, “It is possible that ...”, or “It is possibly the case that ...”.

# Chapter 1

## Introduction

The discipline of “theology and science” (or more generally: “religion and science”) which in the context of this research, is Christian theology and Western science<sup>1</sup> is a relatively recent addition to the formal academic world. The 1960’s is often seen as the decade when it became a subject of formal study. That was when authors such as Ian Barbour (who is seen by some as the founder of the discipline) and Thomas Torrance produced seminal works in the area<sup>2</sup> and the first academic journal (*Zygon*) commenced in 1966.

People have been discussing the relation between theology and science for centuries, but it did not have a formal home. Perhaps the 19th Century was where things started to accelerate, with both positive appraisals from the likes of Hugh Miller<sup>3</sup> and negative such as the infamous work of Draper.<sup>4</sup> But those were days when Newtonian science was

---

1. Up until relatively recently this would have been what was meant by the term; but now it includes all the major religions Helen De Cruz, ‘Religion and Science’, in *The Stanford Encyclopedia of Philosophy (Summer 2021 Edition)*, vol. <https://plato.stanford.edu/entries/religion-science/> (Stanford University, 2022).

2. Ian Barbour, *Issues in Science and Religion* (Hoboken, NJ: Prentice Hall, 1966), and Thomas F. Torrance, *Theological Science* (Oxford: OUP, 1969).

3. Hugh Miller, *The Testimony of the Rocks; or, Geology in its Bearings on the Two Theologies: Natural and Revealed* (Boston MA: Gould / Lincoln, 1862).

4. John Draper, *History of the Conflict between Religion and Science* (Cambridge: CUP, 2010 (1874)).

riding high. Since the beginning of the 20th Century science has developed rapidly, with several paradigms being overthrown, starting with Newton. All this has led to increased specialisation; something that is reflected in the evolution of religion and science. Once it was established, with several departments and chairs, specialisms arose (e.g. physics and religion, and neuroscience and religion).<sup>5</sup> It is in this domain that the relevant work of Donald M. MacKay is situated, and hence it is the context for this research.

## 1.1 Motivation

Even before “religion and science” became established in academe, Donald M. MacKay was building links between the two, based upon his scientific findings. He was not originally interested in philosophy, but realised that certain of his scientific findings had philosophical relevance, and from that also theological relevance. Hence, from the late 1940s until his death in 1987 he wrote about and discussed issues relating to philosophy and theology, and science, whilst remaining first and foremost a scientist. His two main contributions were: first, to recognise that information and energy, and hence mind and body could be understood to be related in a manner that did not require dualism (whilst maintaining duality), which he called *complementarity*; and second, to see that even in a strongly deterministic universe, because of specific features of cognitive agency, it was impossible to tell a cognitive agent what they were going to do in their immediate future. This he termed *Logical Indeterminism* (hereafter: LI). These two contributions are related in that the latter is presented in the context of the former. The key idea being that what one can say about a subject depends crucially upon one’s *standpoint*.

Unfortunately, since his death very little has been done by way of analysis and critique of his ideas. This is despite the fact that a lot of research has been carried out in the areas to which his work is relevant, yet his contributions do not figure in the discussions.<sup>6</sup> This

---

5. A more recent interest has developed in AI and religion, although the most recent overview of the field in the *Stanford Encyclopedia of Philosophy* does not mention AI.

6. The one exception is a PhD thesis on MacKay’s Biblical Anthropology: David Norman, ‘Mind, Body,

strikes me as being to the detriment of the field; therefore in this dissertation I present a critical evaluation of MacKay's two aforementioned contributions, mainly focussing on his LI since that is the more controversial and problematic.<sup>7</sup>

## 1.2 Outline of the Argument

I shall present a critical analysis of MacKay's two main ideas: *Complementarity* and *Logical Indeterminism* with the focus being on the latter. These two are examples of *standpoint*.<sup>8</sup> Each of these arose from reflection on his scientific work: the former from experiments on high frequency electronics and the latter from a thought experiment about brain measurements.

Looking first at complementarity. According to MacKay, two, or more, descriptions are complementary if they refer to the same entity and each is complete with respect to its own standpoint. He identified two types of complementary description: *non-hierarchical* and *hierarchical*. An example of a non-hierarchical complementarity is a projection of all

---

and the Philosophical Theology of Donald M. MacKay' (PhD diss., University of Edinburgh, 2004).

7. It is worthwhile at this point to provide some personal motivation. I have known about Donald MacKay for most of my life. I grew up in Wick (his home town) and his youngest sister was my first Sunday school teacher. Another sister was my Primary 4 teacher. She was married to the free Church minister there. As an undergraduate student at Aberdeen University I was very taken with MacKay's philosophical ideas and upon graduating applied to do a PhD at Keele, hoping that he would be my supervisor. I went to visit Keele only to be told that Prof. MacKay was just retiring and would not be taking on any new students. I did however have a meeting with him.

Two things stand out in my memory about that meeting: the first is that he made it clear that I would not be able to focus on his philosophical ideas while at Keele, which was fair enough since the studentship would have been funded by the Science Research Council, but it also highlighted the primary importance of science in his professional life. The second is his response to me telling him that I had found his philosophical ideas hard to grasp. He said "I comfort myself that St. Paul had the same problem".

I withdrew my application; this was providential since, as it turned out, I was not suited to neuroscience, and moved in the opposite direction to MacKay, ending up in AI.

8. Or *perspective*.

the points of an object in 3-Dimensional space to 2-Dimensional spaces. Any two such projections will be complementary to each other. An example of hierarchical complementarity is the relation between the physical and semantic representations of the same message written, say, on a blackboard. MacKay used hierarchical complementarity as a non-dualist solution to the mind/body problem, which he referred to as “*Duality without Dualism*”. MacKay’s original version of hierarchical complementarity is, in its basic form, identical to supervenience. However, I suggest that use of non-hierarchical complementarity, and the recognition and inclusion of semantic ambiguity in the hierarchical version makes it more general, and more applicable.

The issue of free will and determinism is still very much alive, with a large and growing literature. MacKay was a compatibilist, in line with a slight majority of philosophers.<sup>9</sup> Most compatibilists do not see the availability of alternative possibilities as necessary for freedom. One exception to this is Christian List,<sup>10</sup> who seeks to combine compatibilism with libertarianism (something MacKay also sees as possible) by means of a modal approach. While the attempt is intriguing, it ultimately fails because the way he combines supervenience with alternate possibilities creates a conflict.<sup>11</sup> However, were one to use the more general version of complementarity it is possible to construct a theoretical scenario in which it would work. On the theological side one person who proposes a combination of Calvinism and libertarian approaches is Oliver Crisp, though his approach is incompatibilist.<sup>12</sup>

This leads us to look more closely at MacKay’s LI. The results of this analysis can be summarised as follows:

---

9. At least of those in the analytic tradition.

10. Christian List, *Why Free Will is Real* (Cambridge, MA: Harvard University Press, 2019), Christian List, ‘What’s wrong with the consequence argument: a compatibilist libertarian response’, *Proceedings of the Aristotelian Society* 119 (2019): 253–274

11. See Section 4.4

12. Oliver D. Crisp, ‘Libertarian Calvinism’, chap. 7 in *Free Will and Classical Theism: The Significance of Freedom in Perfect Being Theology*, ed. Hugh J. McCann (Oxford: OUP, 2016), 112–130.

1. Building on his view that the mind/brain relation is one of complementarity, MacKay identified that it is not possible for any cognitive agent to have knowledge of the complete state of their own brain (and hence of their thoughts which would be correlated with the brain state). The complete specification of their brain state does not exist for them.
2. An external observer can, in principle, have such knowledge.
3. Assuming strong determinism an external observer could then, in principle, predict another agent's behaviour.
4. This prediction cannot be communicated as something which "would have an unconditional claim" to the agent's assent as inevitable (because of 1. above). Ultimately the agent cannot be told what they are going to do in their immediate future; so they are free in a real sense.
5. I argue that MacKay's version of LI is an example of the modal fallacy.
6. Reframing it in fully modal logic terms (using possible worlds) can resolve the fallacy and result in a version of compatibilist-libertarianism. As such it provides *a* means of addressing the aims of List and Crisp.
7. MacKay highlighted that LI applies in dialogical situations.
8. MacKay argued that LI suggests that any Deity must be multi-personal. He only considered how this might apply to the economic Trinity. The analysis herein suggests that it could also apply to the ontological Trinity in a manner in keeping with classical Christian theism.

In the end one may conclude that Donald MacKay was ahead of his time. His ideas address issues that are of interest today, such as perspectivism,<sup>13</sup> theology and science,<sup>14</sup> and the ongoing debate surrounding determinism and free will.

---

13. Michela Massimi, *Perspectival Realism* (Oxford: OUP, 2023).

14. Neil Messer, *Science in Theology: Encounters between Science and the Christian Tradition* (London: T & T Clark, 2020).

## 1.3 Structure of the Dissertation

The rest of this thesis is structured as follows: In the next chapter (Chapter 2) I shall give a brief overview of the life of Donald MacKay. In Chapter 3 I present a review of complementarity, the first of his contributions on the importance of standpoint (and which also forms a basis for his LI). LI is mainly utilised by MacKay as his proposed solution to the problem of determinism and free will, therefore in Chapter 4 I provide a summary of that field. Since the recent literature on free will and determinism is very extensive this is just a high-level summary focussed on compatibilism (since that is MacKay's position). I shall look at one contribution in more detail: Christian List's "Compatibilist-Libertarianism" because it aims to achieve the same end as MacKay. The next two chapters present a critical analysis of LI, first as it applies to an individual agent (Chapter 5) and second with respect to agents in dialogue (Chapter 6). I propose a modal version which improves and extends MacKay's version. Finally, in Chapter 7 I provide some general conclusions.

## Chapter 2

# Donald MacCrimmon MacKay (1922 – 1987)

Donald MacCrimmon MacKay was an eminent Scientist and Christian apologist. He was a pioneer in the early days of information theory, artificial intelligence, and neuroscience, but is relatively unknown these days. Therefore, in order to provide context for the ideas explored in the following chapters, I shall present a brief biographical sketch of his life in this chapter.

The fact that people do not know *about* him would not have bothered MacKay: he did not reckon analysis of his personal life important, preferring that his ideas be scrutinised instead. “When reminded that he was a model for many in the UK and USA he would smile and shake his head.”<sup>1</sup> But the fact is that his ideas are also relatively unknown these days.

---

1. J W Haas, ‘Donald MacCrimmon MacKay (1922 – 1987): A view from the other side of the Atlantic’, *Perspectives on Science and Christian Faith* 44 (1992): 55–61.

## 2.1 Early Years

Donald MacCrimmon MacKay was born in Lybster, Caithness, the eldest child (and only son) of Henry (a Free Church minister and GP) and Janet MacKay. Much of his childhood was spent in Wick, where he attended the high school. Growing up in the Free Church Donald received a solid biblical and theological education, both in church and at home, which stood him in good stead in later years.<sup>2</sup>

During his teenage years Donald developed a keen interest in physics, particularly electronics and set up a laboratory in the garden shed. He and some other like-minded pupils formed a radio club that adopted the motto “It is better to send than to receive”<sup>3</sup> (so the biblical education was paying off). This was a time when radio communication was becoming more readily available commercially, and his ability to keep the family radio operating properly and to repair friends’ radios enabled him to demonstrate his entrepreneurial spirit. He set up his own little business and was in such demand that he was able to supplement the family finances. Such was his proficiency in practical electronics that a wartime colleague commented that “Donald must have been born with a soldering iron in his hand.”<sup>4</sup> In the latter part of his school career Donald would sometimes head off on his bike into the countryside and read. One of the books he enjoyed was Arthur Eddington’s *The Nature of the Physical World*<sup>5</sup>

He finished his time in secondary education as *Dux* of Wick High School and went on to study Physics (with a specialisation in Electronics) at St Andrew’s University in 1940.

---

2. Much of the information for this biographical sketch was gleaned from Valerie MacKay’s unpublished biography of him: Valerie MacKay, ‘Donald M. MacKay: A Biography by his wife, written for their grandchildren’ (Unpublished, 2021)

3. Ibid.

4. E F Evans, ‘Donald MacCrimmon MacKay, 1922 – 1987’, *Experimental Brain Research* 66 (1987): 225–227 E. F. “Ted” Evans was a close friend and colleague of MacKay, and succeeded him as Head of the Department of Communication and Neuroscience at Keele.

5. This is the book of his 1928 Gifford Lectures: A. S. Eddington, *The Nature of the Physical World*, 1st (Cambridge: CUP, 1929).

Because of the exigencies of war, the honours degree, normally four years, was squeezed into three. In later life he was happy to tell stories of his time at St Andrew's that were against himself and showed his impish sense of humour. One such relates to a fellow student in Halls who tended to play his radio rather too loudly for Donald's liking. To counteract this he constructed a device that would interfere with the radio signal so that it became mostly noise. Then every time the radio got annoying Donald would switch on his device and listen instead to the expressions of puzzlement and frustration emanating from the other student's room. Eventually the radio playing stopped.

As part of the war effort there was a programme set up to find the best young scientific minds to work on top secret projects. Donald, with prizes for physics and maths and a first class honours degree, was identified as an ideal candidate and approached to work at the Admiralty Research Establishment (ARE) on what would come to be known as Radar.<sup>6</sup>

One unfortunate aspect of the religious climate in the early part of the twentieth century was a tendency to defend Christianity by "clever arguments to show the limits of science."<sup>7</sup> As a science student he found these underwhelming, which created a crisis of faith. While he did not stop attending church completely, religion took a back seat during most of his undergraduate career. This was also a time where Donald's view of science was such that he could not see what the point of philosophy was.<sup>8</sup> Fortunately in later life he changed his view on this.

---

6. MacKay, 'Donald M. MacKay: A Biography by his wife, written for their grandchildren'.

7. Oliver R Barclay, 'The Open Mind and other Essays: A Scientist in God's World', chap. Forward, ed. Melvin Tinker (IVP, 1988).

8. MacKay, 'Donald M. MacKay: A Biography by his wife, written for their grandchildren'. This is a little strange given his familiarity with the work of Eddington, *The Nature of the Physical World* which is basically a work of philosophy.

## 2.2 Young Researcher and Academic

Donald moved to the South of England to carry out the initial work that would inform the rest of his career. The development and construction of radar equipment involved a thorough understanding of the new disciplines of communication and information as well as control theory, and Donald quickly became an expert in these. But he was not a disengaged backroom boffin; he was fully involved with the development, deployment, and commissioning of the state-of-the-art equipment and spent time at sea monitoring its performance and effectiveness (even though he did not particularly enjoy the nautical experience).<sup>9</sup>

One of his fellow researchers at ARE was a Christian who invited him along to the (high Anglican) church he attended. Donald accepted the invitation and over time, through the patient pastoral engagement of the vicar (who had himself been a scientist before entering the ministry), entered a renewed and deeper understanding of Christianity. He now had a passion to serve his Saviour and carry out excellent scientific research (the latter being a manifestation of the former); but his previous experience gave him a life-long distaste for anything that smacked of a ‘God-of-the-gaps’ approach to the relation between Christianity and science. His thinking on the relation between theology and science was developed and refined through interaction with Prof. Rayer Hooykaas (Professor of the History and Philosophy of science at Utrecht University) with whom he became close friends. He thereby came to distinguish between a solid biblical foundation to one’s thinking, and what he termed “rationalistic biblicism”.<sup>10</sup>

While working at ARE on high frequency electronics MacKay noted that what could be achieved with these systems had physical limitations analogous to those of quantum physics and that the things measured were related in a complementary manner. These limiting factors he termed “quanta of informaton.” Further discussion and reflection caused him

---

9. MacKay, ‘Donald M. MacKay: A Biography by his wife, written for their grandchildren’.

10. Donald M. MacKay, *The Clockwork Image* (London: IVP, 1974).

to consider that the logical atomism of Wittgenstein's *Tractatus Logico-Philosophicus*<sup>11</sup> was well suited to the logical analysis of information.<sup>12</sup> This then led him to think about what could be considered “complementary relations” more generally. MacKay's basic idea is that two descriptions are complementary “if they refer to the same object, each is in principle exhaustive, yet they make different assertions because the context of the concepts used are mutually exclusive, so that significant aspects referred to in one are necessarily omitted from the other.”<sup>13</sup> Over time he applied this idea of complementarity to information theory, artificial intelligence and neuroscience, as well as science and theology.

There is a view, still prevalent, that human beings can be accounted for purely as material objects: that the mind is simply (or nothing but) the operations of the brain in one way or another. This position MacKay referred to as “nothing-buttery”, and argued that it is clearly undermined by complementarity. It is not brains that think, but persons! In assessing the relation between mind and body, complementarity means that the physical and mental aspects of humans are correlated but not identical. He did not consider dualism as incoherent, just unnecessary. This he referred to as “duality without dualism” and related it to the unity of man as described in Genesis 1 and 2. As such there is a hierarchy in the complementary relations: the thinking person is higher than the brain activity.<sup>14</sup> We will look at Complementarity more closely in chapter 3.

After the war he took up a post as Lecturer in Physics at King's College (part of the University of London) where he continued his research in information and Computing, which in his case was Analogue Computing (for which he received a Ph.D. in 1950). This was a time when scientists were becoming interested in whether machines could be made to behave like humans and “think” for themselves. (The term “Artificial Intelligence” had not yet been coined. That did not happen till the Dartmouth Conference in 1956, at

---

11. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, 2nd edition. (London: Routledge, 2001).

12. Donald M. MacKay, *Information, Mechanism and Meaning* (Cambridge MA: MIT Press, 1969).

13. Donald M. MacKay, ‘Complementarity II’, *Proceedings of the Aristotelian Society* suppl. vol XXXII (1958): 105–122.

14. MacKay, *The Clockwork Image*, p 106.

which MacKay was a British delegate.<sup>15</sup>) The discussion was mainly focussed around the new digital computers, but MacKay was not convinced that that was the correct way to look at the problem: “... being an analogue man ...”.<sup>16</sup> He did not think it was entirely correct to think of it as exactly analogue either, but as some form of hybrid system. These days we are used to hearing about the successes of Machine Learning (especially “Deep” Learning) but what is not generally known is that one of the earliest Machine Learning systems was built by MacKay at King’s College in the late 1940s. It was basic by today’s standards, but it could adapt its behaviour, based on observations, to successfully drop ball-bearings on a target.<sup>17</sup> MacKay was open to the idea that an artificially intelligent artefact could be built; he likened it to *pro-creation* rather than any notion of creation (thereby avoiding the claim that AI was “playing God”).<sup>18</sup> He was sceptical that it could be done with silicon based approaches, suggesting that some kind of ‘wet’ engineering might be required.<sup>19</sup> In fact we are now starting to see moves in this direction with the creation of neural nets constructed from laboratory grown neurons.<sup>20</sup>

In the late 1940s a group of young researchers around London got together to discuss ideas in cybernetics and philosophy of science. They called themselves “The Ratio Club” and included, as well as MacKay, Alan Turing and Grey Walter. No professors were allowed to join in order to allow free discussion (it was felt that someone at professorial level would have an unfair advantage in these discussions). Also at this time he was part of a seminar on the nascent Philosophy of science started by Sir Karl Popper and had a four month residence in the Spring of 1949 at which he had almost daily discussions with the retired philosopher Sir Walter Moberly as well as meeting Michael Polanyi. These interactions undoubtedly had a strong influence on forming MacKay’s understanding and

---

15. Pamela McCorduck, *Machines Who Think*, 2nd ed. (London: Routledge, 2004).

16. Ibid.

17. MacKay, *Information, Mechanism and Meaning*.

18. Donald M. MacKay, *The Open Mind and other Essays: A Scientist in God’s World*, 1st ed., ed. Melvin Tinker (London: IVP, 1988).

19. Donald M. MacKay, *Behind the Eye* (Oxford: Blackwell, 1991).

20. A. Pavlou et al T. Sarkar K. Lieberth, ‘An organic artificial spiking neuron for in situ neuromorphic sensing and biointerfacing’, *Nat. Electron.* 5 (2022): 774–783.

appreciation of, as well as his approach to, philosophy.<sup>21</sup>

At one of the meetings of the Ratio Club, MacKay presented a paradox that he had come across. He had devised a thought experiment in which he considered a scenario where one might try to get a picture of a person's brain by means of what he called a "cerebroscope." From his deliberations on this thought experiment he concluded that "there does not exist a complete specification of a person's brain state that they would be correct to believe and incorrect to disbelieve."<sup>22</sup> This led to the formulation of LI, and we shall explore this idea in detail in Chapters 5 and 6.

As a young lecturer at King's College he learned the effect of a 'word in season'. The Christian staff in the college would meet for lunch from time to time, and on one occasion the professor of New Testament, R. V. G. Tasker, enquired concerning what evangelicals actually believed. MacKay suggested that he could find out firsthand by going to hear Martyn Lloyd Jones who was giving a talk in the College organised by the Christian Union. Tasker attended the meeting, his thinking was changed and he espoused evangelicalism. He went on to edit the IVP Tyndale New Testament Commentary series.<sup>23</sup>

During this time he met and fell in love with a fellow physicist, Valerie Wood. The two were married in 1955 and started a family, which eventually consisted of two boys and three girls. Four of them followed in the broadly scientific footsteps of their parents while one became an accountant (showing that his business acumen was also passed to the next generation).

While at King's, his interest in the relation between science and Religion grew and he became engaged with the Research Scientists Christian Fellowship (RSCF, now named Christians in science, CiS). This organisation had started in the early 1940s under the leadership of Oliver Barclay. MacKay's involvement had such an influence on the group that

---

21. MacKay, 'Donald M. MacKay: A Biography by his wife, written for their grandchildren'.

22. Donald M. MacKay, 'The logical indeterminateness of human choices', *British Journal for the Philosophy of Science* 24 (1973): 405–408.

23. MacKay, 'Donald M. MacKay: A Biography by his wife, written for their grandchildren'.

one recent commentator could write: “Only after a young brain scientist named Donald M. MacKay joined the group in 1948 did the RSCF find its message of the complementary relationship between science and Christianity.”<sup>24</sup>

MacKay had a strong Reformed view of God’s sovereignty. One other reason that he rejected a “God-of-the-gaps” approach was because he understood that God is active in every moment “upholding all things by the word of His power” (Heb. 1:3) For God a miracle is no harder, or different in principle, from his normal operation moment by moment. Some miracles could have a plausible scientific account (e.g. the parting of the Red Sea, which some see as a miracle of timing) whereas others could not (the main one being the resurrection of Jesus).<sup>25</sup>

MacKay did not say very much about the relation between creation and evolution, but he did state that he could see no biblical reason for the rejection of the scientific theory of evolution. He did however, caution against tying one’s view of this relation to any particular scientific theory of evolution, because scientific theories are subject to change; and it makes no difference to the veracity of Christianity whether or not the current theories of evolution turn out to be true or not. Again, we will return to this in chapter 3.

As his thinking developed, he became more interested in understanding the one intelligent being to whom we have ready access (humans) rather than trying to create artificial ones. In 1951 the shift to neuroscience was completed after he spent a year as a Rockefeller Fellow in the United States. He still continued to work in the physics department at King’s, but in 1960 he was head-hunted by the newly established Keele University to fill the research chair endowed by Granada television: “The Granada Chair in Communication” (the name was later changed to “Communication and Neuroscience”) a position he held till his retirement in 1982. A building on the Keele University campus is named

---

24. Christopher M. Rios, *After the Monkey Trial: Evangelical Scientists and a New Creationism* (New York, NY: Fordham University Press, 2014).

25. Donald M. MacKay, ‘Complementarity in scientific and theological thinking’, *Zygon* 9, no. 3 (1974): 225–244.

in his honour.<sup>26</sup>

## 2.3 Professor and Later Years

At Keele he established a world leading interdisciplinary team studying the sensory communication systems of the brain. An example of this is one of Donald and Valerie's last set of experiments. Roger Sperry had won the Nobel Prize in Medicine and Physiology for his work on "split brain syndrome" which occurs in patients who have the bundle of nerve fibres joining the two hemispheres of the brain (the Corpus Collosum) severed as a treatment for epilepsy. Sperry speculated, based on his experimental results, that doing this created "two persons in one cranial space." Donald and Valerie set out to test this hypothesis and found that while the two sides of the brain could be made to compete, this could only be pursued so far, and ultimately the unity of the person would shine through.<sup>27</sup>

Throughout his academic career MacKay engaged with philosophers and theologians on issues related to the mind/body problem and the relation between science and theology: to which he made significant contributions. In all his dealings with others, whether in conversation or debate, he sought to bring glory to Jesus by conducting himself as a Christian gentleman. This is clearly demonstrated in a televised discussion with B. F. Skinner (the major proponent of Behaviourism in the 20th century).<sup>28</sup> About three quarters of the way through, Skinner is perceived by the host, William Buckley Jr, to be struggling, and he starts to pounce on him. At this point MacKay steps in and provides Skinner with a graceful way out; it didn't help Skinner's argument but it preserved his dignity. We will look at some of his interactions with philosophers criticising and debating his ideas in later chapters.

---

26. Evans, 'Donald MacCrimmon MacKay, 1922 – 1987'.

27. Donald M. MacKay & Valerie MacKay, 'Explicit dialogue between left and right half-systems of split brains', *Nature* 295 (1982): 690–691.

28. This debate is available on YouTube (<https://youtu.be/1DMyDYgxFlo>).

Mackay's reputation continued to grow over the rest of his career. This resulted in his receiving an increasing number of responsibilities and accolades. Examples of these reflect the breadth of this respect. As well as being the founding editor of two major scientific journals (Experimental Brain Research and Biological Cybernetics) he was an international member of the neuroscience group at MIT, foreign member of the Royal Netherlands Academy of Arts and Science and recipient of the Heinrich Helmholtz Prize for Distinguished Research in the Cognitive Neurosciences. But it is in the domain of science and religion that his lasting legacy resides, and the last of these accolades was in this areas.

In 1986, while he was suffering from the cancer that would soon take his life, Mackay gave the Gifford lectures at the University of Glasgow. As with all his endeavours he took the remit specified by Lord Gifford in his bequest very seriously. This meant that in presenting his ideas in their Christian context he refrained from making use of Special Revelation and focussed exclusively on the science and what he considered that could tell us about humans, God, and freedom. His diligent adherence to the specification was noted by the chair, Neil Spurway<sup>29</sup> These lectures formed the content of his final book, *Behind the Eye*, edited by his widow Valerie.<sup>30</sup>

Donald MacKay ended his earthly sojourn in March 1987. As Paul Helm wrote:

Those Christians who knew Donald personally give thanks to God for the life and gifts that he gave to him. It was a privilege to see at work someone who was so wholly committed to the obedient service of his Maker and who so readily recognised his sovereignty over his own life and the whole of creation.<sup>31</sup>

---

29. This is from my memory of attending those lectures.

30. MacKay, *Behind the Eye*.

31. Paul Helm, 'The contribution of Donald MacKay', *Evangel* 7, no. 4 (1989): 11–12.

## 2.4 Concluding Comments

MacKay was in many ways ahead of his time with respect to his philosophical ideas. Within philosophy of science there is a growing interest in the idea that perspective is important in the development of scientific theories<sup>32</sup> which resonates with his arguments regarding complementarity. The issue of free will is a very active area of discussion, in fact there has possibly been more written on the subject in the past five decades than in the previous five centuries. And there is currently a burgeoning interest in AI. There has even been a philosophical presentation of concepts very similar to MacKay's ideas on creation and science.<sup>33</sup>

However, Donald MacKay's contributions are hardly ever mentioned today. It is worthwhile, before proceeding to reflect on why this might be the case. The first thing to say is that, as stated above, Donald MacKay was, in professional life, first and foremost a scientist. Those contributions he made to philosophy and the relation between theology and science arose from his reflection on his scientific work. As such it is no surprise that the bulk of his efforts were expended on science, with philosophy and theology being an avocation. That this is so may be seen from the fact that there is very little development of his philosophical ideas over a forty year period. He formulated his ideas from experiments: complementarity from actual experiments and LI from a scientific thought experiment. The dynamic then appears to have been that he published the ideas (in a variety of forms and places, including major philosophical journals (e.g. *Mind*, *Analysis*, *BJPS*, and *Zygon*) and then defended them in response to critics. This resulted in clarification and some refinement, but there was no real push to see where these things might lead.<sup>34</sup>

---

32. Michela Massimi, 'The Routledge Handbook of Scientific Realism', chap. Perspectivism, ed. J. Saatsi (Routledge, 2018).

33. Mark Hausam, 'Neo-omphalos', 2013, accessed, <http://freethoughtforchrist.blogspot.com/2013/06/creation-and-nature-of-time-or-neo.html>, Hud Hudson, *The Fall and Hypertime*, 1st ed. (Oxford: OUP, 2014)

34. For example, towards the end of his life he published a paper in *Zygon*: Donald M. MacKay, 'Machines, brains, and persons', *Zygon* 20, no. 4 (1985): 401-412. The paper is well written and interesting,

As I stated at the beginning,<sup>35</sup> when I mentioned that I was interested in his philosophical work his response was “you won’t do any of that here.” Philosophical programmes generally progress and develop when there is a “next generation” of philosophers who have “sat at the feet of the master” and work to take the programme forward. Unfortunately that coterie did not exist (at least not on the philosophical side). Another one of the main ways of increasing one’s profile and reach in the academic world is by attending conferences and workshops in the field, but there is little evidence of Mackay doing that for philosophy (unlike his scientific activities).<sup>36</sup> We can also consider the references in his papers as reflecting his engagement with the community. For example, from the mid 70’s on there was a significant increase in interest in, and publications on, the problem of determinism and free will, yet in the decade up to his death this is not reflected in his writing.<sup>37</sup> In the book of his Gifford Lectures<sup>38</sup> there are only 101 references, of which 40 are self citations, and of those only 15 are clearly philosophy, the rest being scientific. For the remaining 61 references the breakdown between science and philosophy is similar. Then, there is the not unusual phenomenon that has afflicted several notable figures in the past: being well known in their lifetime, but whose ideas became largely forgotten after their death.

This reflection is highly speculative, and certainly does not amount to a conclusive account of why his philosophical and theological ideas have not received the attention they deserve, but it may go some way to explaining it. Nonetheless, as noted at the start of this section, his ideas are relevant to current issues; therefore it is important to revisit

---

but it contains no new ideas.

35. In footnote 7 of chapter 1

36. I do not include here the *invited* talks he gave and published, of which there are several. These often formed the basis for his books: e.g. Donald M. MacKay, *Science, Chance, and Providence* (Oxford: OUP, 1977); Donald M. MacKay, *Human Science and Human Dignity*, 1st ed. (London: Hodder & Stoughton, 1979); Donald M. MacKay, *Brains, Machines and Persons*, 1st ed. (London: Collins, 1980); Donald M. MacKay, *Science and the Quest for Meaning* (Grand Rapids, MI: Eerdman’s, 1982).

37. He does not mention Peter van Inwagen, ‘The incompatibility of free will and determinism’, *Philosophical Studies* 27 (1975): 185–199, nor Harry G. Frankfurt, ‘Alternate possibilities and moral responsibility’, *The Philosophical Journal* 66, no. 23 (1969): 829–839 which are key publications in the debate.

38. Granted it was edited by his widow.

his contributions and take the work forward. With that in mind we now move on to look at these contributions in greater detail.

## Chapter 3

# Complementarity (Comprehensive Realism)

As we have already noted, Donald MacKay’s philosophical ideas arose directly from his scientific work, both from laboratory experiments and thought experiments, and that they reflected different perspectives on *standpoint*. The earliest of these was his development of *complementarity*. This concept is also foundational in his thinking, upon which his other ideas depend. It is therefore important to understand it in order to fully grasp LI, which I shall discuss in detail in later chapters. Latterly MacKay called it *Comprehensive Realism* (CR). However, CR looks like the name of an overall philosophy, and as Kemeny identifies: “any philosophy worth its salt must account for human freedom”.<sup>1</sup> Therefore I shall continue to use the term “complementarity” and reserve CR to refer to MacKay’s philosophy *in toto* including LI.

When MacKay first presented this idea in the middle of the 20th C. the term “complementarity” had come to be associated almost exclusively with the quantum physics of Neils Bohr in the minds of many scientists and philosophers. It is possibly for this

---

1. J. G. Kemeny, *A Philosopher Looks at Science* (New York, NY: Litton Educational Publishing, 1959).

reason that MacKay received a fair amount of criticism objecting to his “inappropriate” use of the term.<sup>2</sup> He spent a significant amount of time and space dealing with this criticism.<sup>3</sup> His main strategy was to point out that there was nothing unique about Bohr’s use, and that in other domains, such as acoustics, similar complementary relations exist between frequency and time.<sup>4</sup> In fact recently some psychologists have argued that Bohr “borrowed” the term from 19th century psychology.<sup>5</sup> Today, complementarity no longer carries the same influence in quantum physics,<sup>6</sup> so it is unnecessary to say any more about MacKay’s defence against this criticism.

In this chapter I shall present an expository, and critical, review of MacKay’s complementarity since it epitomises the notion of *standpoint* that is fundamental to his philosophy and underpins his LI. I shall propose a slight modification to MacKay’s interpretation and presentation of it that will make it more useful for my discussion of free will and determinism, and LI in subsequent chapters.

### 3.1 Definition and Description

MacKay identifies two (or more) descriptions to be logically complementary when:<sup>7</sup>

C1: They purport to have a common reference,

C2: Each is in principle exhaustive, (in the sense that none of the entities or events comprising the common reference need be left unaccounted for), yet

---

2. Peter Alexander, ‘Complementary descriptions’, *Mind* 65, no. 258 (1956): 145–165; Hugo A. Bedau, ‘Complementarity and the relation between science and religion’, *Zygon* 9, no. 3 (1974): 202–224; P. K. Feyerabend, ‘Complementarity’, *Proceedings of the Aristotelian Society* Suppl. 32 (1958): 75–104.

3. Around 50% of a paper in some cases.

4. MacKay, ‘Complementarity II’.

5. Jerome R. Busemeyer and Peter D. Bruza, *Quantum Models of Cognition and Decision* (Cambridge: CUP, 2012).

6. Mark Harris, ‘Private Communication’ (2021).

7. MacKay, ‘Complementarity II’.

C3: They make different assertions, because

C4: The logical preconditions of definition and/or of use (e.g. context) of concepts or relationships in each are mutually exclusive, so that significant aspects referred to in one are necessarily omitted from the other.

The criteria given above represent the final and fullest presentation of what it means to be complementary; it had evolved over many years. It also enables one to identify things that are not complementary because they violate one or other of the above because they are: (a) referring to different things, (b) synonymous, (c) inexhaustive, or (d) contradictory.<sup>8</sup> Complementary descriptions can be placed into two categories: (i) those that are at the same level (nonhierarchical), and (ii) those which are hierarchic, that is, some concepts are higher, or sit above, others.<sup>9</sup> MacKay illustrates these points and distinctions by means of various examples: points in Euclidean space; a written message, and communication system; the brain; and the relation of God to creation (in the creative act, providence, and miracle). Dealing with each of these in turn will, I hope, help to make MacKay's view of complementarity clear.

In presenting his ideas regarding complementarity he was circumspect in speaking about what it could and should be applied to, and in being clear that it was not a panacea. Writing in 1974:<sup>10</sup>

The following, written in 1953, still summarizes my attitude: "Whenever a new concept swims into philosophical ken there is a danger that it will be overworked by the Athenians on the one hand and abused by the Laodiceans on the other. complementarity is no universal panacea, and it is a relationship that can be predicated of two descriptions only with careful safeguards against

---

8. MacKay, 'Complementarity II', p115.

9. Though it is not always clear into which category a particular example should be placed. Although MacKay does not go into detail on this, it is possible that the hierarchy may form a partial or a total ordering in situations where there are more than two complementary aspects.

10. MacKay, 'Complementarity in scientific and theological thinking', p244, n31.

admitting nonsense. Indeed the difficult task is not to establish the possibility that two statements are logically complementary, but to find a rigorous way of detecting when they are not. A good deal of concentrated hard work is needed on the part of Christians to develop a more coherent and more biblical picture of the relationship between the two. But if once we recognize that at least most theological categories are not ‘in the same plane’ (in the same logical subspace) as most scientific categories, there is no longer any theological merit in hunting for gaps in the scientific pattern. Gaps there are in plenty. But it would seem to be the Christian’s duty to allow—indeed to help—these gaps to fill or widen as they will, in humble and cheerful obedience to the truth as God reveals it through our scientific discipline, believing that to have theological stakes in scientific answers to scientific questions is to err in company with those unbelievers who do the like”<sup>11</sup>

### 3.1.1 A Distinction that makes a Difference

Given what has been said above MacKay feels the need to make clear the distinction<sup>12</sup> between complementarity and a contradiction.<sup>13</sup> He does this by means of two examples. In the first he invites us to place our forefinger (or a pencil) vertically some distance from our eyes. Then to look at some fixed object some distance directly behind the finger, first with one eye, then the other. The result is, or should be, that we see the distant object to the right of the finger if looked at with the right eye, and to the left with the left eye. Of course there is no contradiction here: it is simply that each eye looks at the object

---

11. Donald M. MacKay, ‘An analogy and its limitations’, *Christian Graduate* 6 (1953): 163–164.

12. The definition of information as a *Distinction that makes a Difference* is often attributed to MacKay; usually cited as being in MacKay, *Information, Mechanism and Meaning*, though neither I nor anyone else who has checked has managed to find any evidence for this being something MacKay actually said. Nonetheless it is a very good definition of information, not least because it forms a contrast with something that is uninformative being a *Distinction without a Difference*.

13. Donald M. MacKay, ‘What makes a contradiction?’, *Faith and Thought: The Journal of the Victoria Institute* 97 (1968): 7–14.

from a different standpoint related to the finger.

The second example regards two points presented in the  $xy$ -plane (in a cartesian coordinate system). Both have the coordinates  $(x, y)$ , but we are told that they are not the same point. Is this a contradiction? That depends. If we are told that the space in which the point appear is 2-D, then there is indeed a contradiction and at least one of the statements will have to be retracted. On the other hand, if we are not told the space is 2-D then we are free to suppose that there is not necessarily a contradiction. It may be that the points are in a 3-D (or higher) space, and while they share the same  $x$  and  $y$  coordinates, they differ in the  $z$  coordinate (for example). From this MacKay went on to present the full explanation of complementarity. The key point is that *standpoint* is fundamental.<sup>14</sup>

## 3.2 Nonhierarchic complementarity

This first type follows on directly from what was said in the last section regarding points in space. Consider an object in a three dimensional space the coordinates of which can be represented by  $x$ ,  $y$ , &  $z$  axes. Each point in the object can then be projected onto one of three planes in 2-space: the  $xy$ -plane, the  $xz$ -plane, and the  $yz$ -plane. Consider then the  $xy$ -plane, one can project all the points of the object onto that plane. Some information will be lost in that several points will be co-incident, but all the points will be there. (This is similar to *Dimensionality Reduction* as used in data science to make problems more tractable.) Similarly all the points can be projected onto the  $xz$ -plane and  $yz$ -plane. Each of those projections are complementary to one another, and each clearly meets the specified criteria. One other thing to note is that the information that is lost in each projection is a relation between the points: those points that are indiscernible in one projection will be discernible in the other projections.

---

14. Such confusion would, of course, be avoided by using the standard notation such that it is  $(x, y)$  for 2-Space and  $(x, y, \dots)$  for putatively higher dimensional spaces.

MacKay makes a clear distinction between this dimensional reduction and the kind of “projection” one gets from a photograph. In that case it is only the points that are part of the plane that appear in the photo, so while each photo represents one plane of an object, they are not complementary in MacKay’s sense, since the points appearing in each photo are not exhaustive.<sup>15</sup>

### 3.3 Hierarchic complementarity

The second type of complementarity identified by MacKay, and the one he wrote most about, is “Hierarchic.” Following on from the previous section, perhaps the most trivial hierarchy would be between the 2-D projections of an object and the 3-D descriptions of that object. But most of his attention was given to situations in which the complementary descriptions were from different domains of discourse and used different languages.

**Signs and Information Systems** An example, which MacKay sees as hierarchical is the relation between a “sign” and the “thing signified.” Whether they are actually hierarchical may depend on the context of the situation. Consider the following:

## HE’S TAKEN THE SET

We have no problem in identifying that as a declarative statement; we should also have no problem in seeing that it is also displayed as a spatial distribution of ink dots on paper (or pixels on a screen). A chemist (or physicist) could give a complete description

---

<sup>15</sup> It may also be noted, in this context, that the complementary projections are not totally disjoint. Each 2-D projection shares a dimension with another projection (e.g. the  $xy$ -plane and  $xz$ -plane share the  $x$ -axis). And all three 2-D planes share the same origin (which is a single point) MacKay, ‘What makes a contradiction?’

(in the language of their scientific domain) about the distribution of dots or pixels (or chemical composition for that matter). That is, there need be no gaps in the chemical description of what is on the page, yet say absolutely nothing about the message (information) presented. Conversely a linguist could give a description of the of the syntax and semantics of the message that is complete with respect to their domain. This is a static example, but it could be taken a stage further and we could pass the message (suitably encoded) down a communication channel (e.g. a telephone line). In this case the linguist could present exactly the same explanation (independent of the medium), and an electrical or communication engineer could give a complete description in terms of encoding, transmission of bits, energy expenditure etc. (again saying nothing about the message itself).<sup>16</sup>

Both these cases are examples of complementarity of the physical and informational domains: each description is complete with respect to the language of its domain. The independence of the descriptions is manifested by considering the communication system. In this example the message is transferred from the Sender (S) to the Receiver (R); that is, the flow of information is from S to R. On the other hand the energy source may well be at the R end of the channel, in which case the energy flow is from R to S. So information and energy flow in opposite directions.<sup>17</sup> While they are independent they are not unrelated, In fact they are very strongly correlated, though in MacKay's view there is a hierarchy here with the informational aspect being above the physical. This is because in the case of the message, MacKay claims that *one cannot change the meaning of the message without also (significantly) changing the physical layout of the message.*<sup>18</sup> For example, one could not change the sentence above to read "He's taken the car" without a corresponding change in the physical layout of the pixels. Conversely, there can be significant change in the physical layout (e.g. pixels disappearing) without changing its meaning, as seen in the versions of the message below. Here, in the first case half the pixels are removed, yet one can still make out what the message is; in the second case all

---

16. MacKay, 'Complementarity in scientific and theological thinking', p232.

17. MacKay, *Behind the Eye*, p46.

18. MacKay, *The Open Mind and other Essays: A Scientist in God's World*, p55.

the internal pixels have been ‘removed’<sup>19</sup> leaving only the letter boundaries. Yet, again, the message is unchanged. There are limits to this: if many more of the pixels in the first version are removed, or extensive damage is done to the boundary in the second, then the message will no longer be readable.<sup>20</sup>



HE'S TAKEN THE SET

Perhaps the most important aspect of this idea is that the informational and physical perspectives here, being highly correlated, form duals. This has enabled MacKay to speak of “duality without dualism”<sup>21</sup> which he made significant use of in dealing with the mind/body problem. For that duality the hierarchy is with mind at the higher level.<sup>22</sup> The key distinction here is between what might be seen, and told, by an external observer and the experience of the person being observed themselves. This he referred to as the “O-story” (for Observed or Outside) and the “I-story” (for “I” - first person singular - or Inside). The distinction and relations are show in Table 3.1.

---

19. Or rather, changed to the same colour as the background.

20. And of course there is the well known example of how the message can change simply by shifting some pixels: “God is nowhere” versus “God is now here.”

21. Donald M. MacKay, ‘Ourselves and our brains: Duality without Dualism’, *Psychoneuroendocrinology* 7, no. 4 (1982): 285–294.

22. It should be noted that MacKay is at pains to make clear that he does not consider the dualist position to be incoherent or indefensible; he simply does not see it as necessary, given the duality apparent here MacKay, *Behind the Eye*. This way of looking at things avoids the issue of having to account for how mind and body interact. It also does more justice to the idea of humans as a unity. MacKay’s Biblical Anthropology has been comprehensively covered by David Norman, *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922–1987*, 1st (Lampeter: The Edwin Mellin Press, Lampeter, 2007) so I shall not go any further with that specific issue here.

| <i>Experience</i> | <i>Physical Activity</i> |
|-------------------|--------------------------|
| <i>I-story</i>    | <i>Brain Story</i>       |
| I feel ...        | Neural activity a        |
| I see ...         | Neural activity b        |
| I hear ...        | Neural activity c        |
| I think ...       | Neural activity d        |
| I like ...        | Neural activity e        |
| I believe ...     | Neural activity f        |
| etc.              | etc.                     |

Table 3.1: The I-story and the brain story (O-story), from ‘Behind the Eye’ p 3.

The way in which MacKay presents his view of duality, in particular the idea of the necessity of embodiment has given rise to accusations of materialism<sup>23</sup> or semi-materialism.<sup>24</sup> That MacKay is not a materialist is demonstrated by how he describes embodiment hierarchically. Whilst he clearly identifies mind as being embodied in the brain, and thus directing it, he further sees spirit as being embodied in the mind and thus directing it.

According to this view, which I like to call “Comprehensive Realism”, mental activity determines brain activity by being embodied in it. Spiritual life similarly shapes mental life by being embodied in it.<sup>25</sup>

Now since neither mind nor spirit are physical, the mere fact of embodiment in MacKay’s ontology does not entail anything needing to be “material” or physical.<sup>26</sup>

23. Gordon H. Clark, *Behaviorism and Christianity*, 1st ed. (Jefferson, MD: Trinity Foundation, 1982).

24. William A. Dembski, ‘Converting Matter Into Mind: Alchemy and the Philosopher’s Stone in Cognitive Science’, *Perspectives on Science and Christian Faith* 42, no. 4 (1990): 202–226.

25. MacKay, *The Open Mind and other Essays: A Scientist in God’s World*, p71 originally published as Donald M. MacKay, ‘Brain research and human responsibility’, in *Horizons in Science*, ed. Carl Henry (Harper. & Row, 1978)

26. We can also point to the fact that in identifying things that are not complementary because synonymous, MacKay uses declarative sentences from English and French to make the point: “My pen

MacKay further develops the description of complementarity with the example of an analogue computer solving a differential equation. A computer engineer and a mathematician will have different, and complementary understandings of the system.<sup>27</sup> Again changing the equation will necessitate a change in the computer set up. However, in this case, if a resistor blows the results produced cannot be trusted.<sup>28</sup> He relates this to Polanyi's proposal<sup>29</sup> regarding the hierarchies in natural life.<sup>30</sup>

### 3.3.1 Nothing-buttery

MacKay used complementarity as a vehicle to respond to the idea that humans are nothing but the totality of their physical (actually material) attributes, a notion, associated during MacKay's life with the writings of the lawyer Clarence Darrow and the Nobel Prize winning Biochemist Jacques Monod, amongst others.

MacKay points out that a viewpoint that arose from the overwhelming success of science, particularly in the 19th century was *Ontological Reductionism*.<sup>31</sup> This was the idea that because science could account for certain phenomena in natural terms, therefore these phenomena were nothing but what science presented. That being the case, so it was said, there was no need to postulate any additional entities other than the physical or material. But as the illustration of the sign shows such reasoning is fallacious, and so MacKay gave it the not very flattering name "*Nothing-buttery*".<sup>32</sup> This form of reductionism should be is black." and "Ma plume est noire." These both instantiate the same proposition. One might even say that the proposition supervenes on the declarative sentence. Now neither declarative sentences nor propositions are "material"

27. MacKay, 'Complementarity in scientific and theological thinking'.

28. Again showing that there are circumstances where the lower level will affect the higher.

29. Michael Polanyi, 'Life's irreducible structure', *Science* 160 (1968): 1308–1312.

30. This again highlights the hierarchical relation. The change in resistance may be accommodated within certain bounds, but beyond that it changes things, but the change in equation absolutely necessitates a change.

31. MacKay, *The Clockwork Image*, p43.

32. Ibid.

distinguished from the common practice in science of reducing objects or systems to their component parts in order to understand them better.

MacKay also distinguished Noting-buttery from another use of science to overcome superstition. The example he gives is of a child being born with a hare-lip. Here a pre-scientific belief is refuted by a genetic account.<sup>33</sup> The difference lies in the fact that in the case of the sign discussed above, if the message had been different the distribution of pixels would have to be different; whereas in the case of the hare-lip the outcome, as defined by the genetics would be the same regardless of whether a hare had crossed the path of the expectant mother. This is an example of what MacKay is referring to in the quote at the beginning of this chapter: complementarity is not a panacea, and the trick is in distinguishing when it applies and when it does not.

### 3.4 Supervenience

The term *Supervenience* appears to have been coined in the 1920's, but it did not have the status that it does today; that seems to be associated with its use by Donald Davidson.<sup>34</sup> While there are several developments and lengthy analyses available,<sup>35</sup> the basic definition is commonly agreed as being: "A set of properties A supervenes upon another set B just in case no two things can differ with respect to A-properties without also differing with respect to their B-properties."<sup>36</sup> One side effect of MacKay's description of hierarchic complementarity is that it coincides with this basic definition of supervenience. MacKay nowhere uses the term supervenience, and probably was not aware of it.

---

33. MacKay, 'Complementarity in scientific and theological thinking', p 44.

34. Donald Davidson, 'Mental Events', in *Experience and Theory*, 1st, ed. L. Foster and J. W. Swanson (Clarendon Press, 1970), 207–224.

35. e.g. Brian McLaughlin and Karen Bennett, 'Supervenience', in *The Stanford Encyclopedia of Philosophy (Summer 2021 Edition)*, ed. Edward N. Zalta, vol. URL = <<https://plato.stanford.edu/archives/sum2021/entries/supervenience/>>. (Stanford University, 2018)

36. *ibid.* A very similar definition is given in an earlier publication: Terence Horgan, 'Supervenience', in *The Cambridge Dictionary of Philosophy*, ed. Robert Audi (Cambridge: CUP, 1995), 778–779

The main problem here is that supervenience has come to be associated with the physicalism of such theologians as Nancey Murphy,<sup>37</sup> which she refers to as “non-reductive physicalism.” There is nothing in MacKay’s writings that give any indication that he would have seen his approach as being in the same school as those thinkers, in fact as noted above, there is no reason to suppose that his views could necessarily be bound to any form of physicalism. David Norman deals briefly with this issue in his book in the context of anthropology.<sup>38</sup> I do not think he succeeds in distancing MacKay’s view from supervenience.

The basic definition of supervenience does not require, or even suggest, a one-way relation. In fact supervenience is *reflexive*, *transitive* and *non-symmetric* (i.e. neither symmetric nor anti-symmetric). It is reflexive because one cannot change *A* without changing *A*. It is transitive because if *A* supervenes on *B* and *B* supervenes on *C*, then *A* supervenes on *C*. And it is non-symmetric because it is sometimes symmetric (e.g. *A* supervenes on *A'* and vice versa) and sometimes anti-symmetric: “while the mental may supervene on the physical, the physical does not supervene on the mental”.<sup>39</sup> It is also worth noting that despite the fact that it is often associated with a physicalist outlook, this is not essential. The aforementioned example of *A* and *A'* being symmetrically supervenient shows it applies when neither relata are physical.

However, there are two things to consider here: first hierarchical complementarity is not the only form of complementarity that MacKay proposes. At the very least this would make complementarity more general than supervenience. Second consider again the example of a message that we looked at previously: “He’s taken the set.” In that discussion we did not present any particular context and took it for granted that the sentence was unambiguous. However, the term *set* is highly ambiguous: it has 430 separate

---

37. Nancey Murphy, ‘Physicalism without reductionism: Towards a scientifically philosophically, and theologically sound portrait of human nature.’, *Zygon* 34, no. 4 (1999): 551–571.

38. Norman, *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922–1987*, 259–259.

39. McLaughlin and Bennett, ‘Supervenience’.

definitions.<sup>40</sup> So, if we set [*sic*] a couple of contexts: one being in a tennis match and the other as being an antique shop then that same message would have completely different meanings. It could refer to Andy Murray, say, winning a tennis set, or to the fact that a customer had just bought a complete set of something (plates, say). Then if we consider that the same person could be both an antique shop keeper and a tennis fan then one could envisage a scenario where the shopkeeper is in the process of selling a set of plates while keeping one eye on the tennis match being broadcast. Then consider that the sale is completed at the same time as the tennis set is won. In that case the focus could alternate between the two meanings of the statement without the underlying physical structure changing. Here, then, we have a situation where the “lower-level” remains constant while the “higher-level” changes.<sup>41</sup> This is the opposite of what MacKay said, and, more importantly, goes against the standard definition of supervenience.<sup>42</sup> This again provides that complementarity is, at least potentially, more general than supervenience, and can be used to distance complementarity from physicalism and materialism.<sup>43</sup>

The key thing to note here is that in the extension to the analysis proposed in neither direction does the definition of supervenience apply. That is, as noted, it is possible to change the meaning without changing physical appearance, and as before we can change the physical appearance without altering either meaning.

---

40. The entry in Oxford English Dictionary 2<sup>nd</sup> edition has 60,000 words: Guinness World Records., *Guinness World Records* (London: Guinness World Records Limited, 2023)

41. In this case we are interested in the objective situation regarding the physical structure and semantics of the message rather than the perceptual psychophysics of the agent. As such the story is purely illustrative.

42. Because in this case it is possible to change either the physical or informational aspects without changing the other.

43. We shall return to this topic in chapter 4.

## 3.5 Theological Considerations

In his writings MacKay spent a significant amount of time and space dealing with the relation between science and theology, especially in providing an alternative to the “God-of-the-gaps” approach. With regard to complementarity that meant discussing the two major categories of *creation* and *providence* including *miracle*.

### 3.5.1 Creation

Just as MacKay has been accused of materialism (or at least “semi-materialism”, whatever that is)<sup>44</sup> so he has been accused of being a Theistic Evolutionist. True he does make statements such as: “This idea . . . that God’s way of working has been slow and gradual . . . is all that should be meant by the term ‘evolution’ as used in science . . . Nothing in the Bible rules it out.”<sup>45</sup> However, MacKay’s view on this arises from his Reformed theological outlook. It will be no surprise to discover that his view on this, as well as on other topics on the relation between theology and science is innovative (and unique).

His starting point is God as the author of all things that were, are, or ever will be, in this universe (God-as-Author as MacKay refers to Him). His most detailed discussion of the issue occurs in his 1968 paper<sup>46</sup> “The Sovereignty of God in the Natural World.”<sup>47</sup>

---

44. Such as by Dembski, ‘Converting Matter Into Mind: Alchemy and the Philosopher’s Stone in Cognitive Science’, despite his having written against materialism. The interesting thing here is that Dembski was challenged about this by Oliver R Barclay, ‘Donald MacKay and Semi-materialism’, *Perspectives on Science and Christian Faith* 43, no. 2 (1991): 141 and in his response William A. Dembski, ‘Conflating Matter and Mind’, *Perspectives on Science and Christian Faith* 43, no. 2 (1991): 107 deals with each criticism of his article except Barclay’s. In that response he simply repeats what he said in the original paper, completely ignoring Barclay’s point.

45. MacKay, *The Clockwork Image*, p51.

46. Donald M. MacKay, ‘The sovereignty of God in the natural world’, *Scottish Journal of Theology* 21 (1968): 13–26.

47. MacKay is very reticent about comments on evolution, and says relatively little about it (especially

God-as-Author creates and upholds all things moment by moment from the standpoint of eternity. He sees creation as “a spatio-temporal unity” as a whole. Hence asking when the world was created runs into the problem of tenses: “at no point in your time, and yet at every point in your time”.<sup>48</sup> As with any author, God-as-Author has complete control over his narrative, to “write” or “re-write” as the occasion demands. This understanding was influenced by the writings of Dorothy L. Sayers who saw that the low view of divine creativity should be eliminated by consideration of human creativity.<sup>49</sup>

MacKay uses these observations to sidestep any confrontation between science and Christianity regarding the question of origins:

In discussion of the Genesis narrative it is often insufficiently recognised that God’s last creative act is recorded not in chapters 1 and 2 but is chapter 3. ‘And God said . . . “Cursed is the ground because of you . . .”’ In short we are told that the created order as we know it is a revised version.<sup>50</sup>

That is, from our post-fall standpoint what we see are the results of a “rewrite” by God-as-Author. We have no access to the pre-fall world; for us it is not a once was, but a might have been. He did however caution against tying one’s view of this relation to any particular scientific theory of evolution, because scientific theories are subject to change; and it makes no difference to the veracity of Christianity whether or not the current theories of evolution turn out to be true or not.

Here MacKay sees the fall as being key to understanding the world as we see it now. It is a world under a curse: “The whole creation has been groaning together in the pains of childbirth until now” (Rom 8:22). The fall then resulted in a complete rewrite of the narrative, as is the author’s prerogative. Thus there should be no surprise that what we

---

considering how prevalent it was in discussions of science and religion in the middle of the 20th C.)

48. MacKay, ‘The sovereignty of God in the natural world’, p 14.

49. Dorothy L. Sayers, *The Mind of the Maker* (London: Methuen, 1941).

50. MacKay, ‘The sovereignty of God in the natural world’.

see has all the hallmarks of “nature red in tooth and claw.”<sup>51</sup>

In this respect MacKay expresses sympathy for the views of Philip Henry Gosse. Gosse was a well established Naturalist and contemporary of Darwin. Gosse was described as “the David Attenborough of his day.”<sup>52</sup> He also proposed a way of harmonising Scripture and evolutionary theory by means of distinguishing between ‘prochronic’ and ‘diachronic’ time<sup>53</sup> which gave rise to the appearance of age that seems to allow for evolution. Unfortunately he tied this idea to the time of creation rather than the fall. His idea was not well received, being ridiculed in both the scientific and religious establishment, and receiving particularly harsh treatment at the hands of Charles Kingsley.<sup>54</sup> However MacKay clearly sees that of the two Gosse had a better grasp of the issues than Kingsley. He does not agree with Gosse’s claims regarding the “age of the earth” but he does acknowledge that any creation (wherever done) would have a putative appearance of age.<sup>55</sup> Interestingly, although MacKay does not attest any further metaphysical analysis of the events surrounding the Fall, a more recent suggestion, proposed independently by the philosopher Hud Hudson, makes use of the distinction between “Time” and “Hypertime” to suggest how the Young Earth Creationists (YEC) could account for their view on this basis.<sup>56</sup>

So much for creation. We must now move on to see how MacKay develops things to account for God’s providential upholding of everything.

---

51. Originally from *In Memoriam A. H. H.* by Alfred Lord Tennyson, it has become a commonplace to describe evolutionary development such as by Richard Dawkins, *The Selfish Gene* (Oxford: OUP, 1978)

52. Ann Thwaite, *Glimpses of the Wonderful: The Life of Philip Henry Gosse*, 1st (London: Faber & Faber, 2001).

53. Philip Henry Gosse, *Omphalos: an Attempt to Untie the Geological Knot* (Paternoster Row, London: London: John van Hoorst, 1857).

54. Thwaite, *Glimpses of the Wonderful: The Life of Philip Henry Gosse*.

55. Donald M. MacKay, ‘Science and Christian Faith Today’, in *Real Science, Real Faith*, ed. R. J. Berry (Monarch, 1991), 88–97.

56. Hud Hudson, ‘An essay on Eden’, *Faith and Philosophy* 27, no. 3 (2010): 273–286; Hudson, *The Fall and Hypertime*. It should be pointed out that Hudson does not believe the theory, but is putting it forward to show that there is still work to be done by anyone seeks to undermine the YEC position.

### 3.5.2 Providence

As stated, MacKay holds that all things are maintained in existence moment by moment by the word of God-as-Author. He explained it by means of an illustration.<sup>57</sup> In the original version he envisages a cricket match as it appears on a screen, but instead of being generated by a camera at a real cricket field it is created as a series of images drawn by an artist as “a continual pattern of events on a screen, “with the aid of some flexible electronic contraption”.<sup>58</sup> Today that “electronic contraption” would be something like an iPad. The images created by the artist form a coherent temporal sequence and depict a complete cricket match. The trajectory of the ball as it leaves the bowler’s hand; or the forces involved in the contact between bat and ball etc.<sup>59</sup> Here the observer could generate a complete physics of the scenario without ever having to invoke the Artist in order to account for gaps in the story. Nonetheless the whole scenario is completely dependent on, and defined by, the actions of the artist “frame by frame.” There is no conflict between the two accounts. Again we can see the relationship as one of complement. The similarity between MacKay’s account here and the Occasionalism of Malebranche<sup>60</sup> has not gone unnoticed.<sup>61</sup> No one has suggested that MacKay is an Occasionalist, though his work does predate the increase in interest in the work of Malebranche,<sup>62</sup> and it might be worthwhile to explore what, if any, the relation is.<sup>63</sup> There are two pertinent considerations here: first

---

57. MacKay, *The Clockwork Image*, p 58–60.

58. Ibid., p59.

59. the realm of science fiction, especially in the form of film has given rise to analyses in the form of books such as Lawrence M. Krauss, *The Physics of Star Trek*, 1st (New York, NY: Perennial, 1996).

60. Nicholas Malebranche, *The Search after Truth*, ed. tr. T. M. Lennon and P. J. Olscamp (Cambridge: CUP, 1997).

61. John Garvey, ‘The Real MacKay’, 2016, <https://potiphar.jongarvey.co.uk/2016/07/24/the-real-mackay/>.

62. Steven Nadler, ed., *The Cambridge Companion to Malebranche* (Cambridge: CUP, 2000).

63. The fact that an author does not mention some historical approach may mean only that they were unaware of it, not that they are doing something different. For example Plantinga’s early work, Alvin Plantinga, *God, Freedom and Evil* (New York, NY: Harper, 1974) makes no mention of Molina, though it is very similar, yet later he became a clear supporter of Molina: Alvin Plantinga, ‘Supralapsarianism, or ‘O Felix Culpa’’, in *Christian Faith and the Problem of Evil*, ed. Peter van Inwagen (Eerdmans, 2004), 1–25

Malebranche introduced his Occasionalism as a means of overcoming certain deficiencies in Descartes' mechanics. As such it may be seen as an example of a God-of-the-gap approach. Second, Plantinga espouses a form of moderate Occasionalism (where he views the physical world as being directly caused moment by moment by divine action, but not the mental acts and choices of free agent).<sup>64</sup> This is possibly something to which Comprehensive Realism could make a contribution.<sup>65</sup>

## Miracle

Given what has been said above it is no surprise that MacKay does not consider miracles to be anything special with respect to God-as-Author's upholding of all things. It is not a case of why there are miracles, but the question is why are there not more miracles than there are (or were)? The answer lies, according to MacKay, in God's faithfulness and rationality.<sup>66</sup> As was noted above God-as-Author sees the creation as a whole, and in that sense miracles form part of the narrative as He has planned it rather than as an interference with the order of the universe. No doubt, from a scientific viewpoint, miracles are a deviation from the norm, but that is not the same as deviation from the overall plan. This raises the question of whether a miracle can be accounted for scientifically? That is, could someone who was not privy to the details of a miraculous event provide a rational scientific explanation?

MacKay's response is that it depends, and he identifies three categories of miracle.<sup>67</sup> The first one is those situations where the natural phenomena themselves could be used to account for the event. There are the so called "miracles of timing." The best known of these is the parting of the Red Sea (Exod. 14). Here several narratives have been presented to account for it by means of the timing of natural phenomena such as, in this

---

64. Alvin Plantinga, 'Law, cause and occasionalism', chap. 6 in *Reason and Faith: Themes from Richard Swinburne*, ed. Michael Bergmann & Jeffrey E. Brower (OUP, 2015), 126–144.

65. This is something that will be explored in chapters 5 and 6 with respect to freedom and determinism.

66. MacKay, 'The sovereignty of God in the natural world'.

67. MacKay, 'Complementarity in scientific and theological thinking'.

case counter tides causing a trough in the sea sufficient to walk across combined with a strong east wind. In this case the divine narrative and the scientific account of the event coincide.<sup>68</sup>

The second category is where the miracle and any scientific account of the event do not, indeed cannot, match. However, both are rational from their respective standpoints. This is because the scientific account cannot explain the miracle *qua* miracle (*that* is beyond its ken). An example of such a situation would be Jesus turning the water into wine as recorded in Jn. 2. In this miracle the master of the feast comments that it is the best wine. He does not know how the wine was actually produced and presumably thinks it came from grapes. Even if he had access to the best, most advanced, modern technology, there is no test, nor scientific theory available to him, that would suggest that the wine he had just tasted started out as anything other than grapes. On the other hand, the servants knew what had actually happened.<sup>69</sup>

The third category are those things that cannot be accounted for in scientific terms. The paradigm example of this is the resurrection of Jesus. This is a unique event that has no parallel in science.<sup>70</sup>

The first two categories can be seen as depicting complementary relations of different kinds, whereas the third in its uniqueness does not admit of any complement, being the first-fruits of the world to come (1 Cor 15).

---

68. MacKay, 'Complementarity in scientific and theological thinking'.

69. This is a case where a conflict could arise if, in the context, the servants told the Master what had actually happened but he was unwilling to accept the testimony and to rely on his own understanding.

70. We can include the resurrections recorded in Matt. 27: 52-53 in this overall event.

## 3.6 Criticisms

As noted previously much of the criticism levelled at complementarity during MacKay's lifetime was focussed on its deviation from Bohr's usage. MacKay dealt with these criticisms in detail. They do not add anything of interest to the current discussion. Norman<sup>71</sup> has provided an extensive review of these, and MacKay's responses, so the interested reader is directed to that thesis and book for further details. However, there are a couple of interactions with complementarity that neither MacKay nor Norman have dealt with. As part of his analysis of the contribution of science to theology Austin<sup>72</sup> looks in a fair degree of detail at MacKay's approach. First, he correctly notes the irrelevance of quantum usage to MacKay's programme. He quotes MacKay's definition and from this identifies four conclusions, which as they are stated are not things with which MacKay would disagree.

1. The complementarity of two statements does not imply that there can be no conflict between them;
2. not all apparently-conflicting scientific and religious assertions are complementary;
3. in many cases it is difficult to tell whether a given pair of assertions are complementary or not.

Austin then makes some pertinent critical observations. The first is similar to that made above regarding the ambiguity of the sentence used: "He's taken the set.", but he refers to the Gestalt shift in observing the duck-rabbit figure (or Necker cube). And Austin draws a similar conclusion: that the situation does not match the definition of hierarchical complementarity. One thing that accounts for this is a distinction between objective and subjective aspects of the situation. That is, while the line shapes in the

---

71. Norman, 'Mind, Body, and the Philosophical Theology of Donald M. MacKay'; Norman, *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922-1987*.

72. W. H. Austin, *The Relevance of Natural Science to Theology* (London: MacMillan Press, 1976).

figure remain the same, the subjective switch between a duck and a rabbit requires a change in brain state, because they represent different perceptual standpoints.<sup>73</sup> This is slightly different from my example where the semantic ambiguity is objective. Austin also picks up on MacKay's statement about origins and he says

For example, the doctrine of Creation and an account of world-origins in scientific cosmology are not complementary, since they fail to meet MacKay's condition (a): they fail to have the same reference. The one is about all events (asserting that they all depend on a certain way on the Creator), the other is about a certain restricted set of events, long ago.<sup>74</sup>

However, the full quote from MacKay is:

As Mascall has put it: "The relation between God and the world, to which the term 'creation' applies, is to be identified not with an act in the past by which the world was originated, but with an incessant activity by which it is conserved in existence."<sup>75</sup> The "world" here referred to is thus the whole of our space-time and not any particular temporal cross section of it; and the creative act that gives being to our space-time is clearly not itself an isolable event in our time, any more than the creation of a novel by a human author is an event on the time scale of its characters.<sup>76</sup>

Austin then asserts that cosmological origins are not about evolutionary origins and therefore not hierarchically complementary. However, this is to misunderstand MacKay's

---

73. As MacKay says in respect to the Necker cube MacKay, *Behind the Eye*, p109: "I put it to you that what you are seeing as it flips is the conscious experience which is the correlate of the presence of two subroutines in the organizing system."

74. Austin, *The Relevance of Natural Science to Theology*, p 77.

75. E. L. Mascall, *Christian Theology and Natural Science* (Harlow: Longman, 1956).

76. MacKay, 'Complementarity in scientific and theological thinking', p 234.

point. Taking this statement in conjunction with his statement in his 1968 paper in the *Scottish Journal of theology*<sup>77</sup> it would appear that MacKay is referring to both, as noted above in section 3.5.1. Finally Austin picks up on the issue of whether God is a feature of the situation in the parting of the Red Sea; in which case the scientific and theological aspects would not be complementary. But again this is to misconstrue MacKay's view. The sending of the east wind in Ex. 14:21 is simply an explicit expression of God's continuous activity in the world (as in His care for sparrows as we are told in Luke 12: 6). As such it is consistent with MacKay's presentation of complementarity. Those criticisms notwithstanding, Austin sees MacKay's views as a positive contribution to the relations between science and theology worthy of further exploration and development.

A final interesting point is raised by Duce.<sup>78</sup> He takes onboard much of the criticism presented by Austin and on balance prefers the approach taken by J. P. Moreland in *Scaling the Secular City*.<sup>79</sup> The reason is that Moreland's approach is seen as being more general than MacKay's since it includes a moral dimension. MacKay explicitly states that his complementarity is not concerned with morals.<sup>80</sup> The difficulty with this is that it is not always easy to refrain from making moral judgements based on ones' scientific beliefs. For example, in seeking to illustrate complementarity, Norman uses the example of two boys putting a lump of sodium down a toilet which then cracks.<sup>81</sup> The scientific aspect is plain enough, but Norman's "complementary" aspect is to ask about the ethics of the action.

In this chapter we have presented an overview of MacKay's theory of complementarity including some ways in which he applied it to various issues in the interactions between science and theology. In many ways MacKay was ahead of his time. Several of the topics

---

77. MacKay, 'The sovereignty of God in the natural world', p 14.

78. Philip P. Duce, 'Complementarity in perspective', *Science and Christian Belief* 8, no. 2 (1996): 145–155.

79. J. P. Moreland, *Scaling the Secular City: A Defense of Christianity* (Ada, MI: Baker Academic, 1987).

80. MacKay, 'Complementarity in scientific and theological thinking'.

81. Norman, *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922–1987*, p 114–115.

that he explored have become areas of current interest and relevance. I have already mentioned Hud Hudson. And Luciano Floridi in connection with specific issues, but the latter's work on Philosophy of information<sup>82</sup> in general and "Levels of Abstraction"<sup>83</sup> in particular have a strong affinity with MacKay's ideas.

The main outcome of this work for MacKay was to have a coherent means of describing the relation between mind and brain and while this dissertation is not focussed on the Mind/Body problem, the complementary relationship proposed by MacKay is important for his argument for LI. A change, or extension, was made to the description of complementarity based on some linguistic ambiguities, was made in order to clearly differentiate it from supervenience.<sup>84</sup> In the next chapter we will look at some of the approaches to the problem of determinism and free will as a lead into examining LI in detail.

---

82. Luciano Floridi, *The Philosophy of Information*, 1st ed. (Oxford: OUP, 2011).

83. Luciano Floridi, 'The method of levels of abstraction', *Minds and Machines* 18 (2008): 303–329.

84. One might comment in passing that had Mackay used any term other than 'complementarity' (including 'supervenience') people might now be using and developing his ideas rather than Davidson's.

## Chapter 4

# Determinism and Free will

The most controversial aspect of MacKay's philosophy relates to his proposed solution to the problem of the *determinism* and *free will*. This issue is still very much alive, in fact there have possibly been more publications on the topic in the past five decades than in the previous five centuries. During his lifetime MacKay had several debates on the issue<sup>1</sup> but despite this and the recent intense interest in the topic, his contributions have been ignored since his death. In order to see how MacKay's views fit in to the landscape and how they differ from other proposals (and hence contribute to the debate) I present an outline of the area in this chapter.

This recent interest in the relation between determinism and free will was provoked by Peter van Inwagen's 1975 paper "The incompatibility of free will and determinism".<sup>2</sup> It is interesting to note that, contrary to the title of that paper, a recent survey<sup>3</sup> found that a majority of philosophers would classify themselves as compatibilists, 59.1% (with 13.7% classifying as libertarian, 12.2% thinking there is no free will and the rest with other less

---

1. See chapter 5.

2. Inwagen, 'The incompatibility of free will and determinism'.

3. David Bourget & David J. Chalmers, 'What do philosophers believe?', *Philosophical Studies* 170 (2014): 465–500.

standard views).<sup>4</sup> One thing this highlights is that no one, expert or otherwise, really knows whether determinism is true or not.<sup>5</sup>

Prior to van Inwagen, Frankfurt had posited, by means of several examples, that alternative possibilities are not necessary for a person to be considered responsible for their actions.<sup>6</sup> The subsequent research activity has pushed things forward by either supporting or criticising one or other of these positions. By and large, compatibilists have been favourable to Frankfurt and critical of van Inwagen. Mackay's views were well settled on the matter long before it became such a popular topic of research. He would be considered a compatibilist, though as we shall see, of a unique sort. We shall look at his contributions in the following two chapters.

Given the state of play in the field, it is not possible to provide a comprehensive review of the positions and debates in the area. Therefore I shall endeavour to provide a high level overview of the main issues and a more detailed exploration of a proposed solution that seems to me most relevant to MacKay's analysis: this is the "compatibilist-libertarianism" of Christian List.<sup>7</sup>

The exposition and analysis will be covered from a compatibilist perspective since, as noted, MacKay is a compatibilist.<sup>8</sup> For the most part the focus will be on the philosophical aspects, but since Mackay's work has been applied to God's predestination and foreknowledge, we will briefly look at how the general principles have been applied by

---

4. While this is an interesting statistic it is not clear what significance one should put on it in this context since there is a similar breakdown between classification as Atheist/Theist. It would be interesting to know what the breakdown on this topic was amongst theistic philosophers. The survey is also limited to Analytic Philosophy for the most part.

5. Helen Beebe, *Free Will: An Introduction* (Basingstoke: Palgrave MacMillan, 2013).

6. Frankfurt, 'Alternate possibilities and moral responsibility'.

7. Christian List, 'Free will, determinism and the possibility of doing otherwise', *Nous* 48, no. 1 (2014): 156–178; List, *Why Free Will is Real*; List, 'What's wrong with the consequence argument: a compatibilist libertarian response'.

8. For further details and arguments the interested reader may consult Helen Beebe's introduction, which is a thorough, engagingly written, analysis. Beebe, *Free Will: An Introduction*

some to that area. For a fuller treatment of this aspect one may consult books dealing with that debate such as *Divine Foreknowledge: Four Views*.<sup>9</sup>

## 4.1 The Consequence Argument

To proceed we need a definition of determinism. Beebe provides a useful definition:

*Determinism*: “is the thesis that (i) all the laws of nature have this feature – they always specify a unique outcome for a given set of initial conditions – and (ii) everything that happens in the Universe falls under some law of nature or other.”<sup>10</sup>

Free will is more controversial, so we shall simply describe what different groups mean when they use the term as we go along.

As noted above, much of the latter day debate around determinism and freewill centres on the “Consequence Argument” (CA) first presented by van Inwagen.<sup>11</sup> This argument starts from the position that for an agent to be free they must be/have been able to do/have done otherwise. That is, there must be more than one course of action *open* to them: this is known as the *Principle of Alternative Possibilities* (PAP).<sup>12</sup> From this van Inwagen proposed the CA. The first version was presented as a concrete example in a number of stages, but its substance can be captured in a single syllogism (SCA):<sup>13</sup>

SCA1: A necessary condition for someone’s action to count as free is that the agent can do otherwise.

---

9. James K. Beilby and Paul R. Eddy, eds., *Divine Foreknowledge: Four Views* (London: IVP, 2001).

10. Beebe, *Free Will: An Introduction*.

11. Inwagen, ‘The incompatibility of free will and determinism’; Peter van Inwagen, ‘When is the Will Free?’, *Philosophical Perspectives* 3 (1989): 399–422.

12. C. Ginet, ‘Can the will be caused’, *The Philosophical Review* 71 (1962): 49–55.

13. This version of the syllogism is from List, ‘Free will, determinism and the possibility of doing otherwise’.

SCA2: Determinism implies that the agent cannot do otherwise.

SCA3:  $\therefore$  Either there are no free agents, or determinism is false (or both).

This makes plain the key issues that need to be addressed in order for compatibilism to succeed. Van Inwagen also provided a more detailed, and formal version of the CA. This is shown in its full formality in Table 6.1. This argument can be expressed informally, albeit more verbosely, in ‘longhand’. Here the square symbol “ $\square$ ” is the standard modal logic operator meaning “it is necessarily the case that ...” (i.e. the proposition it is attached to is true in all possible worlds), the symbol “ $\supset$ ” is the propositional logic symbol for material implication (if ... then ...) and “ $N$ ” is a modal operator introduced by van Inwagen meaning “the attached proposition is true, and there is nothing anyone could have done to make it false,” and the ampersand is the symbol for logical conjunction. The symbols “ $l$ ,” “ $p_o$ ,” and “ $p$ ” stand for “the laws of nature,” “a set of initial conditions of the universe sometime in the dim and distant past,” and “an event/action that takes place in the present” respectively.

The argument then goes: (CA1), if determinism is true then in every possible world (or situation) it is the case that given the laws of nature and the fact that there were the relevant initial conditions, then the action/event  $p$  will occur. (CA2) follows by means of the rules of propositional logic and means that, again, it is true always and everywhere that given that the initial conditions happened then the laws of nature ensure that the action/event will occur. Then according to the rule  $\alpha$  (CA3) the proposition of (CA2) holds and there is nothing you can do about it. Two premises are introduced into the argument: that both the initial conditions (CA4) and the laws of nature (CA6) are such that they cannot be made false. So from these premises and the Rule  $\beta$  we get, first that if the laws of nature hold then action/event  $p$  will occur, and the conclusion that event  $p$  will indeed occur, and in neither case is there anything that can be done that will make it not the case. That is, given the laws of nature and the initial conditions the event/action  $p$  will happen and there is no decision you make that will prevent it (or rather every decision that is made will lead to the event/action  $p$ ). This is just another way of stating

(SCA3). Therefore in what follows we will focus on the argument as presented in SCA.

|  |                                   |                                  |
|--|-----------------------------------|----------------------------------|
| Rule $\alpha$ : From $\Box p$ infer $Np$                 |                                   |                                  |
| Rule $\beta$ : From $Np$ and $N(p \supset q)$ infer $Nq$ |                                   |                                  |
| (CA1)  | $\Box((p_o \ \& \ l) \supset p)$  | from determinism                 |
| (CA2)  | $\Box(p_o \supset (l \supset p))$ | from CA1 and propositional logic |
| (CA3)  | $N(p_o \supset (l \supset p))$    | from $R\alpha$                   |
| (CA4)  | $Np_o$                            | Premise                          |
| (CA5)  | $N(l \supset p)$                  | from CA3, CA4, and $R\beta$      |
| (CA6)  | $Nl$                              | Premise                          |
| (CA7)  | $Np$                              | from CA5, CA6, and $R\beta$      |

Table 4.1: van Inwagen’s Consequence Argument

## 4.2 Compatibilist Responses

Incompatibilist philosophers and theologians endorse the CA; but that is not the end of the debate even for them. There are those who favour (hard) determinism such as Gordon Clark<sup>14</sup> and Ted Honderich,<sup>15</sup> and who dispense with free will. At the other end of the spectrum there are those such as William Lane Craig,<sup>16</sup> Robert Kane<sup>17</sup> and Alvin Plantinga<sup>18</sup> who eschew determinism and argue vigorously for libertarian free will. Both Clark and Plantinga, for example, from their diametrically opposed positions, con-

14. Gordon H. Clark, *Predestination* (Phillipsburg, NJ: Presbyterian & Reformed, 1969).

15. Ted Honderich, *A Theory of Determinism: The Mind, Neuroscience and Life-Hopes* (Oxford: OUP, 1988) Ted Honderich, *On Determinism and Freedom* (Edinburgh: Edinburgh University Press, 2005)

16. William Lane Craig, ‘Divine Foreknowledge: Four Views’, chap. *The Middle Knowledge View*, ed. James K. Beilby and Paul R. Eddy (London: IVP, 2001).

17. Robert Kane, *The Significance of Free Will* (Oxford: OUP, 1996) Robert Kane, ‘Free Will: new directions for an ancient problem’, in *Free Will*, ed. Robert Kane (Oxford: OUP, 2003), 222–248

18. Plantinga, *God, Freedom and Evil*; Alvin Plantinga, ‘On Ockham’s way out’, *Faith and Philosophy* 3, no. 3 (1986): 235–269.

sider compatibilism not to be coherent. In fact of the four positions presented in *Divine Foreknowledge: Four Views*: Open Theism,<sup>19</sup> Simple Foreknowledge,<sup>20</sup> Molinism,<sup>21</sup> and Calvinism<sup>22</sup> only the last is presented as compatibilist.<sup>23</sup> However, as noted above, the majority of philosophers favour a compatibilist approach<sup>24</sup> and Mackay's position is compatibilist so the rest of this section will provide a summary of some compatibilists responses to the CA.

There are several ways by which compatibilists have countered the CA. Several of these challenge the idea that determinism means inability to do otherwise. Of course that in itself requires that one has a clear understanding of what "ability" means. For example Vihvelin,<sup>25</sup> and following him, Beebee<sup>26</sup> distinguish between 'narrow' and 'broad' ability. Narrow ability could be a skill, such as being able to play the mandolin. One may be prevented from playing it, for example by being locked in a room without it, or being away from home without access to one. Nonetheless, in such circumstances one retains the (narrow) ability. Broad ability is *narrow ability plus opportunity*. Here, being locked in a room, an external interference, prevents the exercise of broad ability. In this case narrow ability is a form of disposition such that where no external factors prevent it one is free to exercise one's dispositions despite being in a deterministic world. Hence, any agent is free because nothing prevents them from acting in accordance with their dispositions. This position has been criticised by the consideration that, for example, if someone had

---

19. Gregory A. Boyd, 'Divine Foreknowledge: Four Views', chap. The Open Theism View, ed. James K. Beilby and Paul R. Eddy (London: IVP, 2001), chapter 1.

20. David Hunt, 'Divine Foreknowledge: Four Views', chap. The Simple Foreknowledge View, ed. James K. Beilby and Paul R. Eddy (London: IVP, 2001), chapter 2.

21. Craig, 'Divine Foreknowledge: Four Views', chapter 3.

22. Paul Helm, 'Divine Foreknowledge: Four Views', chap. The Augustinian-Calvinist View, ed. James K. Beilby and Paul R. Eddy (London: IVP, 2001), chapter 4.

23. It should be stated that all four authors are clear that God's purposes are still achieved within their respective positions.

24. see, for example Daniel C. Dennett, *Elbow Room: The Varieties of Free Will Worth Wanting* (Cambridge Ma: MIT Press, 1984) and Daniel C. Dennett, *Freedom Evolves* (London: Penguin, 2003)

25. K. Vihvelin, *Causes, Laws, and Free Will: Why Determinism Doesn't Matter* (Oxford: OUP, 2013).

26. Helen Beebee, 'Compatibilism and the ability to do otherwise', in *Reason and Responsibility: Readings in Some Basic Problems of Philosophy*, 16th, ed. J. Feinberg & R. Shafer-Landau (Cengage, 2016).

a severe psychological fear of certain things that made them freeze in its presence, they would possess both the broad and narrow ability and yet be unable to act (for example, a person who was a very good mandolin player but froze because of stage fright every time they tried to perform in public). They would still have the relevant disposition, but this does not seem to yield the ability to do otherwise required for true freedom of choice and moral responsibility.<sup>27</sup>

Another common approach is to note that the CA contains a conditional and as such if the agent were to try to act differently they would succeed (albeit in a different and counterfactual world).<sup>28</sup> Being a conditional, the fact that determinism ensures that the agent does not do otherwise than they in fact do does not change the truth of the conditional. Hence their freedom remains. Even at a cursory level this seems like sleight of hand, an example of “If the circumstances (antecedent) were different, then the outcome (consequent) would be different,” which applies equally to sentient and inanimate beings. (If I were to change the height from which I drop the ball, then it would bounce higher. We would not attribute freedom to the ball in such a case.) The use of the agential term “try” also seems to introduce a question begging aspect.<sup>29</sup> These arguments have sometimes been combined as a cumulative case. But even that is open to the criticism, highlighted by Lehrer, that neither of them would pass the substitution test whereby the putative interpretation can be substituted into the original (CA in this case) without any significant change to the original meaning.<sup>30</sup>

Another approach that does not see PAP as necessary for freedom of action has been put forward by Fischer and Ravizza.<sup>31</sup> They see the issue of freedom as being related

---

27. Ann Whittle, ‘Dispositional abilities’, *Philosophers’ Imprints* 10, no. 12 (2010): 1–23, List, ‘Free will, determinism and the possibility of doing otherwise’

28. Helm, ‘Divine Foreknowledge: Four Views’.

29. See S. Hurley, ‘Responsibility, reason, and irrelevant alternatives’, *Philosophy and Public Affairs* 28 (2000): 205–241 for other, and more extensive criticism.

30. See Keith Lehrer, ‘An empirical disproof of determinism’, chap. 1 in *Metamind* (OUP, 1990), 19–42 for details. An adapted version is utilised in List, ‘Free will, determinism and the possibility of doing otherwise’

31. John Martin Fischer and Mark Ravizza, *Responsibility and Control: a Theory of Moral Responsibility*

to *control*. They identify two kinds of control: regulative control, which requires PAP, such that an agent must have been able to act other than they actually did in order to have control and; and *guidance control* which and does not require PAP. Guidance control has two components: the first relates to taking responsibility for one's actions based on one's disposition towards those actions, such that the dispositions were acquired in an appropriate way (through, say, a "good" upbringing). The second component is *reasons responsiveness*. They argue for moderate reasons responsiveness which entails:

A mechanism . . . is moderately responsive to reason to the extent that, holding fixed the operation of [that] mechanism, the agent would recognize reasons (some of which are moral) in such a way as to give rise to an understandable pattern (from the viewpoint of a third party who understands the agent's values and beliefs), and would react to at least one sufficient reason to do otherwise (in some possible scenario).<sup>32</sup>

In the end they conclude that this, which they term "semi-compatibilism" defeats both the requirement for PAP and direct attacks on moral responsibility as being incompatible with determinism. In this regard they acknowledge that the CA is effective in its criticism of free will in the sense of regulative control, but not guidance control<sup>33</sup> Overall their approach is in general keeping with the moderate interpretation of Frankfurt cases (see the next Section) and Mackay's views (see the following Chapter).

---

(Cambridge: CUP, 1998).

32. John Martin Fischer and Mark Ravizza, 'Precis of Responsibility and Control: A Theory of Moral Responsibility', *Philosophy and Phenomenological Research* 61, no. 2 (2000): p 444.

33. J. M. Fischer, 'Responsibility and alternative possibilities', in *Moral Responsibility and Alternative Possibilities*, ed. D. Widerker and M. McKenna (Ashgate, 2006), 27–52, but Fischer and Ravizza do not describe it that way since they keep the term 'free' to apply only under guidance control.

### 4.3 Frankfurt Style Cases (FSCs)

One challenge to PAP as something necessary for free will (and hence moral responsibility) was raised by Harry Frankfurt.<sup>34</sup> Frankfurt presented a number of scenarios where one might be considered morally responsible yet have been unable to do other than what one actually did. Several variations of these arguments have been developed which has given rise to the general name: Frankfurt Style Cases (FSCs), and a debate with supporters and challengers. Contributions to this debate continue to this day, showing that it is very much a live issue.<sup>35</sup>

A clear and concise version is provided by List:

Jones is deciding whether to kill Smith. Unbeknownst to Jones, an evil manipulator has implanted a device into Jones's brain through which the manipulator can control Jones. Specifically, the device is set up to monitor Jones's decision process. If Jones independently comes to the decision to kill Smith, then the device does nothing; everything in Jones's brain continues to work as if the device were absent. However, if Jones leans against killing Smith, then the device intervenes and makes him "decide" to kill Smith. Now, suppose that it so happens that Jones makes the killing decision by himself, without any intervention from the manipulative device, and he goes ahead and kills Smith.<sup>36</sup>

---

34. Frankfurt, 'Alternate possibilities and moral responsibility'.

35. e.g. Haji Ishtiyaque, 'A paradox concerning Frankfurt examples', *Synthese* 196, no. 1 (2019): 87–103

36. List, *Why Free Will is Real*, p 169. Beebe, *Free Will: An Introduction*, presents the same example in more detail. Fischer provides the example as a choice of election candidates (whether this is considered a situation relevant to moral responsibility will depend on one's perspective on election choices). J. M. Fischer, 'The Frankfurt cases: the moral of the stories', in *Deep Control: Essays on Free Will and Value*, ed. J. M. Fischer (OUP, 2012), 33–52 Frankfurt, 'Alternate possibilities and moral responsibility' in his original example gives the same general principle in a way that is less concrete and certain than Beebe, Fischer and List.

From this Frankfurt argues that Jones is morally responsible because he acted freely to do what Black wanted (i.e. he was not coerced) despite the fact that he would not have been able to do otherwise, had he shown any inclination to do so. Hence, according to Frankfurt alternate possibilities are not necessary for freedom of action and moral responsibility. So PAP is falsified as a necessary condition of freedom, and hence as a defeater of compatibilism. A similar scenario was posed as a criticism of MacKay's LI.<sup>37</sup> MacKay's response<sup>38</sup> was to acknowledge that in the circumstance in which a device was activated to prevent a course of action, this would be a justification for 'diminished responsibility', but that the responsibility would legitimately transfer to the person doing the manipulating.<sup>39</sup>

FSCs have led to several responses from incompatibilists, because without PAP there is no moral responsibility from an incompatibilist perspective. While attempting an exhaustive examination of all the criticisms and the ensuing debates would make this dissertation intolerably long, two criticisms seem particularly relevant to the current work because they respond to the scenario of direct manipulation of the brain and relate to some criticisms of MacKay's approach.<sup>40</sup> Therefore, we shall briefly look at those: *The Dilemma Defence* and *The Flicker Defence*.

**The Dilemma Defence:** As the name suggests this criticism of FSCs is often presented as a dilemma. The first horn of the dilemma points out that for Black to engage his device requires some kind of neurological "twitch" that he can observe and which will enable him to make the prediction regarding what decision will be made, and thus whether he needs to engage his device or not. If the neurological twitch *causes* the decision, then some form of determinism is in play, and this begs the question against PAP (and hence against incompatibilism). On the other hand, if the neurological twitch does not cause

---

37. J. N. W. Watkins, 'Freedom and predictability: an amendment to MacKay.', *British Journal for the Philosophy of Science* 22 (1971): 263–275.

38. Donald M. MacKay, 'Choice in a mechanistic universe: a reply to some critics', *British Journal for the Philosophy of Science* 22 (1971): 275–285.

39. See Chapter 5.

40. e.g. Watkins, 'Freedom and predictability: an amendment to MacKay.'

the decision there is no basis for Black to know if or when to apply the device, and PAP stands (the second horn).

Whether or not the FSC can be revised to counter this objection is a matter of debate. Ultimately, as Beebee argues,<sup>41</sup> how one views the effectiveness of this defence will depend on how one interprets the purpose of Frankfurt's argument. If one sees it as an attack on PAP, then the defence works. If, on the other hand, it is seen as a defence of compatibilism then its begging the question against PAP is irrelevant since it merely highlights that compatibilism is consistent with a failure of PAP. And in that regard the CA begs the question against compatibilism.

**The Flicker Defence:** In this case the defence pivots on something that may constitute a “flicker of freedom”.<sup>42</sup> The flicker-defender agrees that, in the event, Jones cannot do otherwise than kill Smith. However, there is a prior event, the neurological sign, that is an indicator of a decision being made (or possibly something like ‘blushing’) that tells Black whether or not to apply his device. Fischer<sup>43</sup> does not consider this a sufficient basis to ground Jones' moral responsibility in a robust manner. The upshot is that even if the flicker-defender could come up with a relevant antecedent (mental) action that would robustly ground Jones' responsibility, it is always possible to shift the observation to a time prior to that event. This looks like a detente based on infinite regress. In the end we find once more that how the FSCs are viewed dictates their potency. Again Beebee gets to the heart of the matter.<sup>44</sup> If one views FSCs as defending compatibilism then one reaches the situation whereby standpoint matters. The flicker-defender can carry on believing that PAP holds, and the compatibilist who holds that it is how one comes to a decision that matters rather than the availability of alternative possibilities can, with good reason, deny PAP.

---

41. Beebee, *Free Will: An Introduction*, ePub section: The Dilemma Defence.

42. K. D. Wyma, ‘Moral responsibility and leeway for action’, *American Philosophical Quarterly* 34 (1997): 57–70.

43. J. M. Fischer, ‘Recent work on moral responsibility’, *Ethics* 110 (1999): 93–139.

44. Beebee, *Free Will: An Introduction*, ePub section: The FlickerDefence’.

Both these putative defences are relevant to a discussion of MacKay's approach. The complementarity of the physical and mental in MacKay's philosophy mean that he sees the relation of the observation and the mental decision as being one of *correlation* rather than *cause*. In his analysis of free will and determinism he makes the correlation as strong as possible in order to show how PAP still applies. This also means that with regard to the flicker-defence he agrees that in order to apply any device one must first have an observation from which to make the prediction.<sup>45</sup> This leads to MacKay's merging of compatibilism with PAP. But before looking at MacKay's theory we must first look at another attempt to create a theory of compatibilist-libertarianism that will serve as a lead in to MacKay: the contribution of Christian List.

## 4.4 Compatibilist-Libertarianism

The debates outlined in the previous section have all been based on arguments that are non-modal. A more recent approach from within the compatibilist camp is that of Christian List. He presents a modal argument for combining the putative strengths of determinism and libertarianism, which he refers to as "compatibilist-libertarianism". We will look at this approach in more detail because of its aforementioned claim to combine determinism and libertarianism (indeterminism). For the removal of doubt I shall state the conclusion up front: List's proposal is a major contribution to the field that is detailed, insightful, profound, and, I will argue, seriously flawed. List presents his argument in two forms, dealing first with the simplified version of CA<sup>46</sup> and later with the formal version.<sup>47</sup> Nothing is lost for our purposes by focussing on the first of these, and it avoids making this analysis overly technical. A key distinction that List utilises for his argument is between the *physical* and *agential* levels. He sees the agent level as *supervening* on the physical in

---

45. This is analogous to Popper's contention regarding the theory ladenness of observation. No matter how far back one goes in a chain of theory and observation one always ends up at a theory, even if it is only the theory of what it means to make an observation.

46. List, 'Free will, determinism and the possibility of doing otherwise'.

47. List, *Why Free Will is Real*.

the standard way (as described in Chapter 3) .

The first thing to say is that List basically dismisses FSC's since they go against the intuitive view that we do indeed have choices and that they are necessary for freedom.<sup>48</sup> He does so, I suspect, because he views his method as solving the problem in a way that makes PAP central, such that FSCs become obsolete or irrelevant, regardless of how they are interpreted. The central ideas of List's approach are *agency* and *modality* (Possible Worlds).

List first restates the syllogistic version of the argument as:

LCA1: Free will requires that (at the time of interest) more than one alternative course of action is possible for the agent.

LCA2: Determinism implies that (at the time of interest) only one alternative course of action is possible for the agent.

LCA3:  $\therefore$  Determinism and free will are incompatible.

He views most previous defences of compatibilism as adapting the first premise. He, on the other hand, accepts LCA1, and declares it to be non-negotiable, which means that one has to adapt LCA2. This List does by first noting that LCA2 assumes that the physical and agential levels go together. (That is, it conflates the two by applying it to agential possibility when strictly it applies only to physical possibility.) List considers that this assumption is not generally true. He then restates premise 2 as:

LCA2\*: Determinism implies that (at any given time) only one future sequence of events is *physically* possible.

---

48. Of course, as we have seen above how cogent that is depends on how FSCs are viewed.

He then notes that incompatibilism follows only if LCA2\* implies LCA2, which it does not, in general, do. This is because what is required for that to be the case is what List refers to as the *linking assumption*: “If (at any given time) only one future sequence of events is physically possible, then (at that time) only one course of action is possible for the agent.” Something List claims is not generally true. List divides his argument into two parts: a “Bottom Up” and a “Top Down” part. The Bottom Up argument does the bulk of the heavy lifting, and contains the flaw I mentioned, so I shall focus on that part.<sup>49</sup>

As well as supervenience, the other key component of the argument is *multi-realizability*. That is, each agential state can arise from more than one physical state (and a change in physical state does not necessarily give rise to a change in agential state). So each agential state is an *equivalence class* of the physical states that give rise to it.<sup>50</sup>

List calls his approach “compatibilist-libertarianism” and believes that it constitutes a defence of “free will as a higher level phenomenon” that is “compatible with a scientific worldview”; something that is very much in line with MacKay’s outlook:<sup>51</sup>

- “compatibilist” because of its compatibility with science, including physical determinism; and
- “libertarianism” because of its commitment to the idea that free will involves a genuine ability to choose between different actions.”

An important point that needs to be reiterated here is that the members of an equivalence class are mutually exclusive. This is important for later criticism. List’s key goal in making these distinctions is to allow physical determinism to be coupled with agential

---

49. The top down part simply situates the argument in the general discussion of free will and determinism and does not add anything for my purpose.

50. NB: The members of an equivalence class are mutually exclusive. Hence, once one member is chosen as the current state, the other members are excluded for that situation.

51. List, *Why Free Will is Real*.

indeterminism (or libertarianism). This is similar to MacKay's conclusion with respect to LI that we will look at in the next chapter.

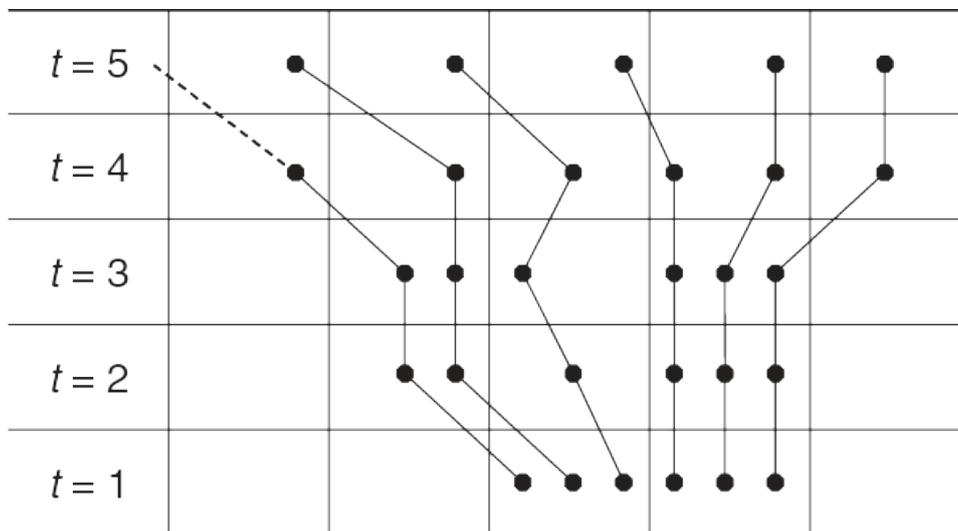


Figure 4.1: World histories at the physical level

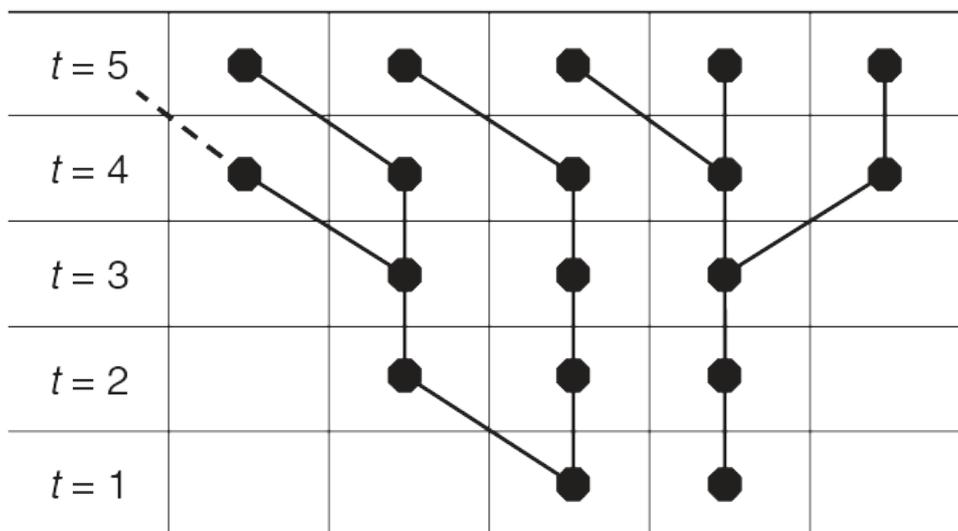


Figure 4.2: World histories at the agential level

The simplest way to explain the idea<sup>52</sup> is by means of a simple example based on the

---

52. I omit the technical details here without loss of generality. The interested reader is directed to List, ‘Free will, determinism and the possibility of doing otherwise’; List, *Why Free Will is Real* and List, ‘What’s wrong with the consequence argument: a compatibilist libertarian response’ in increasing order of technicality for further, fuller, detail.

diagrams in Figures 4.1 and 4.2.<sup>53</sup> Figure 4.1 represents the physical world and Figure 4.2 the agential. Each node in the graphs is a world state (physical or agential), the trajectories are histories, and each vertical box is a time point. Since this is a modal approach it operates according to the semantics of modality regarding “it is possible that” and “it is necessary that”. In this context, the first of these is defined as being true if there is some history that is accessible from some other history at a particular time where *accessibility* refers to those states in a history that can follow from the current state. Supervenience and multi-realizability means that there is a mapping between the states (and hence the histories) at the physical level and those at the agential level.

Now consider the set of possible scenarios shown in Figures 4.1 and 4.2. In this example the time runs from  $t = 1$  to  $t = 5$ . Each state in a box (at a time) at the physical level maps to a single state at the agential level. From Figure 4.1 it can be observed that determinism holds at the physical level as there is no branching in any of the histories. That is because in a deterministic system each state is only accessible to itself. Now consider  $t = 1$ , the supervenience relation ensures that all three states in the left-hand box of the physical system map to the single state in the left-hand box of the agential system. At the agential level, as shown in Figure 4.2, there is, because of this supervenience and multirealizability, branching in the trajectories starting from the initial state in the left-hand box at  $t = 1$ . Then both “it is agentially possible that an agent will do action A” and “it is agentially possible that an agent, S, will not do action A” will be true for some history. Hence, “[a]s this example shows, such agential level indeterminism is entirely consistent with determinism at the physical level, jointly with supervenience and multiple realizability”.<sup>54</sup> Here, then, List believes he has solved the problem of free will and determinism by means of his modal argument.

---

53. These are from List, ‘Free will, determinism and the possibility of doing otherwise’ and are, then, the same example used by List to demonstrate the argument across all three publications.

54. Ibid., p 166.

### 4.4.1 Criticism of the argument

There is however a major problem, it seems to me, with List's argument. In summary, the mistake is forgetting that the members of an equivalence class are mutually exclusive. While it is true that multi-realizability means that multiple physical states map to one agential state, this can only be applied at  $t = 1$ . Once one particular physical state becomes actual (from the equivalence class) at  $t = 1$ , the die is cast and that state then defines the single trajectory that must be followed at the physical level; every other physical state (in the equivalence class) remains merely a possibility (i.e. represents a different possible world) as does every trajectory associated with these states. This much is recognised and stated by List.<sup>55</sup> Now, consider what happens at the agential level. In Figure 4.2 in moving from  $t = 1$  to  $t = 2$  from the left-hand box, it appears that there are two choices. However, this is misleading. The agent level supervenes on the physical level; this means that in order to change agent state, there must be a corresponding change in the physical state (as per the definition of supervenience). Consider the case where the actualised state at the physical level is the rightmost one. That then defines the successor state at the physical level. That physical state maps to the right-hand agential state at  $t = 2$ . In order for the agent to then choose the left-hand state would require them to change the physical trajectory, which violates the assumption of determinism at the physical level. Hence, as formulated by List, this approach does not work.<sup>56</sup>

#### A possible theoretical solution

In engineering there is a principle of "the other way round". That is, if something does not work one way, try doing it the other way round. In the present case that involves making the multi-realizable aspect go from the agential to the physical level so that each physical state could be realised by multiple agent states. It would also mean that the physical

---

55. List, 'Free will, determinism and the possibility of doing otherwise', p 162.

56. List also acknowledges that if the agential level is deterministic then all bets are off. This is another reason to explore MacKay's ideas.

would supervene on the agential. However, it would have the advantage of robustly allowing determinism at the physical level with indeterminism at the agent level, without the problems identified above. The problem could also be avoided with a many-to-many relation such as that identified in the analysis of complementarity in Chapter 3.<sup>57</sup>

## 4.5 Theological Approaches

As one might expect the same or similar, issues arise in the theological sphere regarding free will and responsibility. In fact some of the incompatibilities mentioned in Section 6.1 are also relevant here. Again we will restrict our summary to those who take a, broadly, compatibilist approach, or who have a Reformed position, as MacKay did (for reasons of space).

One major philosophical figure who has written extensively on this issue, defending a Calvinist compatibilism against a variety of other views is Paul Helm. In a recent book<sup>58</sup> he refers to the position as “conditional alternativity” and considers it to be the historical orthodox Reformed view. This is the theological equivalent to conditionality, but in this case the prime mover with respect to the antecedent is God.<sup>59</sup> Another writer who takes a compatibilist view is Preciado.<sup>60</sup> He develops and extends the work of Fischer and Ravizza in a Reformed context. Of course the strengths and weaknesses of these positions highlighted above in the philosophical context will also apply here.

MacKay saw his LI as providing a solution to the debate between Calvinists and

---

57. These are “in principle” arguments and I have no idea whether they would fit with neuroscience. But it is in keeping with the approach of Busemeyer *et al* Busemeyer and Bruza, *Quantum Models of Cognition and Decision*.

58. Paul Helm, *Reforming Free Will* (Fearn: CFP, 2020).

59. It should be said that this is not a universally held position. The context of Helm’s statements is a debate between himself and Richard Muller regarding the structure of Reformed Orthodoxy on this subject.

60. Michael Patrick Preciado, *A Reformed View of Freedom* (Eugene, OR: Pickwick, 2019).

Arminians (though, as noted, he stood in the Calvinist tradition).<sup>61</sup> Relevant to this is the proposal by Oliver Crisp that one can combine Calvinism with libertarian free will (though not in a compatibilist way).<sup>62</sup> His original analysis related to the work of the 19th century American theologian John Girardeau, whom Crisp viewed as a possible contender for holding to this position.<sup>63</sup> In his subsequent publications Crisp seeks to argue that the Westminster Confession of Faith leaves room for such an undertaking. Unfortunately, even if successful, what Crisp has provided is at best a “ground clearing exercise” with little detail regarding how such an approach would work. Even so this attempt has attracted criticism with regard to what it does say. Anderson and Manata<sup>64</sup> have argued that contrary to what Crisp claims, theological determinism is embedded implicitly within confessional Calvinism and rules out libertarian free will. While Crisp does not mention Molinism, and seeks to deal directly with simple free will and God’s sovereignty, it is not obvious how his approach differs in any significant way from the “Middle-knowledge Calvinism” proposed by Tiessen<sup>65</sup> or Ware.<sup>66</sup> Assessing the prospects for Crisp’s programme may become easier once we have explored MacKay’s LI.

---

61. MacKay, *The Clockwork Image*, p 82.

62. Oliver D. Crisp, *Deviant Calvinism* (Minneapolis, MN: Fortress Press, 2014); Crisp, ‘Libertarian Calvinism’.

63. Oliver D. Crisp, ‘John Girardeau: Libertarian Calvinist’, *Journal of Reformed Theology* 8 (2014): 284–300.

64. James N. Anderson and Paul Manata, ‘Determined to come most freely: Some challenges for Libertarian Calvinism’, *Journal of Reformed Theology* 11 (2017): 272–297. One issue here is that Anderson and Manata present the *free will thesis* in terms of a conjunction of acting freely and moral responsibility. This seems to bias the discussion against Crisp, since it is not obvious how acting freely with respect to *things indifferent* necessarily carries moral responsibility.

65. Terrence Tiessen, *Providence and Prayer: How Does God Work in the World?* (London: IVP, 2000).

66. Bruce Ware, *God’s Greater Glory: The Exalted God of Scripture and the Christian Faith* (Wheaton, IL: Crossway, 2004).

# Chapter 5

## Logical Indeterminism

In this chapter we shall look at MacKay's proposed solution to the problem of free will and determinism: LI.<sup>1</sup> This is probably the most controversial of MacKay's ideas. It is also the argument people have found hardest to understand: no doubt a factor in what has made it controversial. As we proceed, as well as analysing MacKay's arguments I shall also argue that MacKay's original formulation is flawed (but that it can be revised to be more robust). For these reasons we will spend more time analysing this aspect of MacKay's contribution. Although it is related to and follows on from complementarity, it is possibly the more interesting and richer of the two ideas.

MacKay's development of the principle of LI arose from a thought experiment he reflected on in the early 1950's. As he put it (in an article responding to some of his critics<sup>2</sup>):

IN THE late 1940s a small group of scientists with a common interest in brain mechanics began to meet for informal discussions at the National Hospital in

---

1. As well as calling it LI Mackay sometimes refer to it as Logical Relativity by analogy with Einstein's physical theory of relativity. Which again highlights the importance of *standpoint* in MacKay's thinking.

2. MacKay, 'Choice in a mechanistic universe: a reply to some critics', p 275.

London. It called itself the Ratio Club, and A. M. Turing and I were members. Some of us were interested in electrical recording from the brain, and at one of our sessions (I think in 1952) I presented a curious paradox that I had stumbled across when trying to imagine what it would be like to be able to inspect at will any selected portion of one's own brain. For reasons which I need not elaborate in the present context, it emerged that certain possible states of one's own visual system, which could in principle be visible to others, must be systematically invisible for oneself: namely, those states from which the visual system would be necessarily disturbed by the changes necessarily concomitant with seeing those states.

To circumvent this limitation, one could of course imagine the subject's receiving a verbal description rather than a visual image of his visual system; so this paradox, though intriguing, was hardly fundamental. Suppose, however, that the roving explorer of the brain were to light upon the cognitive system—the system whose state at a given time represents what the subject believes. Here it seemed to me that the resulting paradox had more far-reaching implications. By the same reasoning, certain possible states of one's own cognitive system, whose specification could in principle be known to others, must be systematically unspecifiable for oneself: namely, those states from which the cognitive system would be necessarily disturbed by the changes necessarily concomitant with believing the specification of them.

What MacKay has identified here is that even in the hypothetical world where a person is able to view their own brain, there is one part of that brain which would be unobservable to the person: the “cognitive mechanism” (or “cognitive system” as he calls it in that paper). From this it was a short step to considering what relation this might have to the question of free will. In the middle of the 20<sup>th</sup> century there was a view, which still pertains today to some extent, that, regardless of what might be the case at the quantum level, genetics had shown that everything in our behaviours is determined by our biological makeup. This was advocated by the aforementioned Clarence Darrow<sup>3</sup>

---

3. C. Darrow, ‘Quoted in’, in *Determinism, Freewill and Moral Responsibility*, ed. G. Dworkin

and Jacque Monod,<sup>4</sup> and used to suggest that people are not free and should not be held morally responsible for their actions (“*It’s not me, it’s my genes*”). Popper<sup>5</sup> had already shown (by computational means) that a person cannot have complete knowledge of a system of which they are a part. MacKay’s thought experiment went beyond this to show that even if one were to assume the most rigid form of determinism, that would not entail that a person was not free, and hence they can be seen as morally responsible.

to reiterate: in this chapter we will explore MacKay’s LI critically, assess its strengths and weaknesses, and present a proposed improvement to the approach.<sup>6</sup>

## 5.1 Outline of MacKay’s Argument

MacKay presented his theory of LI in a number of publications over several years (decades actually).<sup>7</sup> These presentations are fairly consistent, though with some ambiguity that I shall address later.

The key problem addressed by LI is the sense in which a person may be considered free in a world which is taken to be fully deterministic. It must be pointed out at the start, that in exploring this MacKay does not commit to determinism; rather he presents the

---

4. J. Monod, *Chance and Necessity* (London: Collins, 1972).

5. Karl Popper, ‘Indeterminism in quantum physics and in classical physics, I’, *British Journal for the Philosophy of Science* 1 (1950): 117–133; Karl Popper, ‘Indeterminism in quantum physics and in classical physics, II’, *British Journal for the Philosophy of Science* 1 (1950): 173–195.

6. MacKay does say e.g MacKay, *Behind the Eye* that “Logical Indeterminism” is possibly not the best term to use, but it is a way of distinguishing what it is from “physical determinism,” which is taken as read for the sake of argument.

7. e.g. Donald M. MacKay, ‘On comparing the brain with machines’, *American Scientist* 42 (1954): 261–268; Donald M. MacKay, ‘On the logical indeterminacy of a free choice’, *Mind* 69 (1960): 31–40; Donald M. MacKay, ‘Logical indeterminacy and free will’, *Analysis* 21 (1961): 82–83; MacKay, *Behind the Eye*

argument in the context of a “what if” scenario and he is in fact agnostic on the subject.<sup>8</sup> That is, for the sake of argument, he allows the most stringent and restrictive scenario with which the concept of freedom would have to deal, and discusses where that leads.

### 5.1.1 The Basic Argument

We will not be exploring the neurophysiological details of MacKay’s research<sup>9</sup> but we can, crudely, recognise that the brain is composed of several subsystems; e.g. the visual system, the auditory system etc. Most importantly for our purposes there is the Cognitive Mechanism (*CM*). For any particular person, *S*,<sup>10</sup> the *CM*, is described by MacKay as “the place where you store what you know”,<sup>11</sup> and “region concerned with what we know and believe.”<sup>12</sup> In the deterministic world envisaged by MacKay this *CM* will change (update) as a function of time:  $CM(t)$ , and will, for any super-scientist observer, *O* (to be described later), be as well defined, with a claim to their assent, as any other natural phenomenon. MacKay describes the  $CM(t)$  as being made up of three parts:<sup>13</sup>

Skills: “stand for the concatenated organizations of the repertoire which are involved in speaking, writing, and so forth.”

Norms: “a label which includes the whole process of setting priorities, revising some priorities in the light of others and adopting, from time to time, new priorities on the basis of evaluation of the satisfactoriness or otherwise of those currently embodied.”

---

8. MacKay, *The Clockwork Image*, p 107. And as pointed out in Chapter 4 no one knows whether determinism is true or not. Beebe, *Free Will: An Introduction*

9. e.g Donald M. MacKay, ‘Perceptual stability of a stroboscopically lit visual field containing self-luminous objects.’, *Nature* 181 (1958): 507–508; Donald M. MacKay, ‘Psychophysics of perceived intensity: a theoretical basis for Fechner’s and Steven’s laws.’, *Science* 139 (1963): 1213–1216; MacKay, ‘Explicit dialogue between left and right half-systems of split brains’

10. We use *S* for “Subject” since for most of our discussion that is the role they will be playing. It also used to distinguish them from any Observer, *O*. Both *S* and *O* are agents.

11. MacKay, *Behind the Eye*, p 193.

12. *Ibid.*, p 192.

13. *Ibid.*, p 145.

Maps: “indicates that representation, almost certainly implicit, of the layout of the world which determines our conditional readiness to navigate the world.”

MacKay explains the term “conditional readiness” by means of an example:

[S]uppose you drive your car up a semi-circular drive into its garage. In the garage the front wheels will be at a certain angle to the chassis. This angle of the wheels *implicitly represents* the curvature of the drive. It has set up in the car what you could call, in an obvious sense, a ‘state of conditional readiness’ to follow the required path if and when it is set in motion. . . . if you were to drive the car backwards . . . the car would follow more or less the curvature of the drive. So the setting of the wheel implicitly represents the curvature of the drive. . . . [G]iven that this is a goal-directed system, the angle of the wheels represents a ‘conditional readiness’ to match the shape of the drive. You don’t need a to have a little picture of the drive inside the car for this purpose, all you need is the appropriate constraint on its repertoire of action.<sup>14</sup>

This description highlights the fact that MacKay is someone who favours analogue computing<sup>15</sup> over digital. In a digital computer the information is contained in binary digits (*bits*) and a model is explicitly represented as declarative sentences (for example, in the form of ‘if . . . then . . .’ rules).<sup>16</sup> In analogue computers, on the other hand, the model is embodied in the structure of the computer set up for solving the problem (i.e. it is implicit).<sup>17</sup> A schematic depicting in abstract terms the the  $CM(t)$ , showing the Skills, Norms, and Maps is presented in Figure 5.1.

---

14. MacKay, *Behind the Eye*, p 67.

15. His PhD was on analogue computing. Donald M. MacKay and Michael E. Fisher, *Analogue Computing at Ultra-High Speed: An Experimental and Theoretical Study* (New York, NY: Wiley, 1962)

16. It was this ‘rule following’ with certainty that MacKay found troublesome. He saw the solution in a hybrid system, with an analogue computer providing the stochastic aspect. However, even in the 1980s digital computing was moving away from this straightforward logical approach and including probabilistic

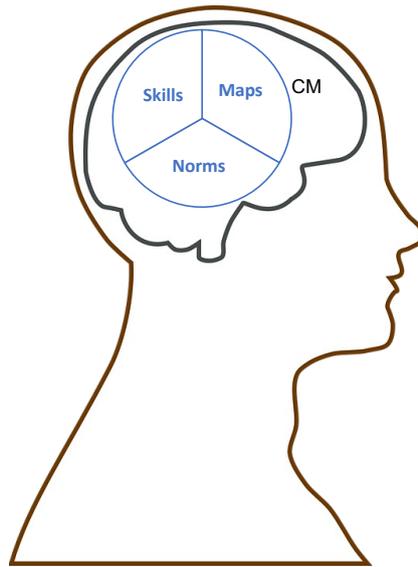


Figure 5.1: The Cognitive Mechanism

In explaining and assessing LI the thing that must be emphasised and held on to is the fact that the argument is based on the outcome of the original “ceresbroscope” thought experiment and the complementary relation between the I-story and the O-story described in Chapter 3: that is where  $S$  tries to observe the state of their own  $CM(t)$ , call this state  $B_i$ . This situation is depicted in Figure 5.2. With respect to the three components of the person, MacKay has identified that it is perfectly possible to be aware completely of their Norms and Skills, but they cannot have complete knowledge of the Maps because that is where any representation of  $CM(t)$  would reside. This can be further seen by considering the correlations shown in Table 5.1; here it is perfectly possible to reflect on each of the elements in the right column except to the final one (in the box), “I believe ...”.  $S$ ’s  $CM(t)$  cannot simultaneously be in state  $B_i$  and observing what state they are in as they would then be in the situation where  $CM(t)$  would be continuously changing, and hence: “no up to date, complete specification of  $S$ ’s  $CM(t)$  exists that  $S$  would be correct to believe and incorrect to disbelieve”.<sup>18</sup> An illustration of this often utilised by MacKay is

---

reasoning, e.g. in the form of Bayesian nets.

17. This is also the case with Analogue Neural Nets, and is one of the major criticisms within AI of the approach: that there is no way of accessing the model and no way of gaining an explanation of how the conclusions/solutions were arrived at. In the current climate, this is rather an important criticism and one that is being vigorously addressed.

18. MacKay, *Behind the Eye*, p 114.

| <i>Experience</i> | <i>Physical Activity</i> |
|-------------------|--------------------------|
| <i>I-story</i>    | <i>Brain Story</i>       |
| I feel ...        | Neural activity a        |
| I see ...         | Neural activity b        |
| I hear ...        | Neural activity c        |
| I think ...       | Neural activity d        |
| I like ...        | Neural activity e        |
| I believe ...     | Neural activity f        |
| etc.              | etc.                     |

Table 5.1: The I-story and the brain story (O-story), from ‘Behind the Eye’ p 195.

the situation that results from putting a microphone in front of a loudspeaker to which it is connected via an amp. The resulting ‘howl’ is due to the positive feedback that cannot stabilise (and is only limited in intensity by the capacity of the amp).<sup>19</sup> This inability of any subject to possess a complete specification of their  $CM(t)$ , even in principle, is key to understanding LI.

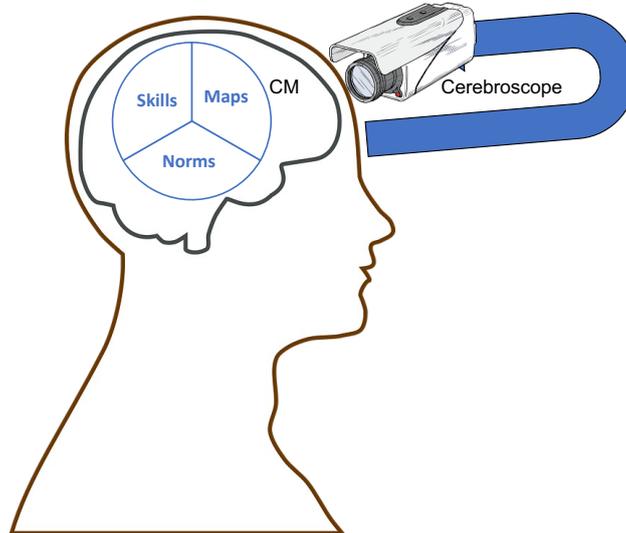


Figure 5.2: The Cerebroscope Experiment

<sup>19</sup> Although this provides an illustration, it should be noted that in the context of LI, it is the fact that the CM is involved, and that in a reflective manner that is important.

To illustrate this, consider again Table 5.1. If one is in state  $B_i$  one might think one could believe the proposition:

$P_1$  : I believe I am in state  $B_i$

But of course  $P_1$  is not one of the propositions that are part of  $B_i$ , so  $S$  would find themselves in a new state  $B'_i$ , which is not the same as  $B_i$  (it is in fact  $B_i \cup P_1$ ). And this would continue *ad infinitum*.

From this MacKay went on to ask what, if any, relevance this might have to issues regarding free will. He identified two ideas of freedom which he referred to as *freedom of caprice*, and *free agency*. He rejected the former as being unnecessarily restrictive, amounting to “*unpredictable by anyone*”. The latter he stated as “the outcome of the decision is up to him,” that is:<sup>20</sup>

... unless he makes the decision it will not be made, that he is in a position to make it, and that no fully-determinate specification of the outcome already exists which he would be correct to accept as inevitable, and would be unable to falsify, if only he knew it.

This definition of freedom is taken as MacKay’s definition for the purposes of logical indeterminism by Jeeves in his exposition of MacKay’s ideas.<sup>21</sup> This statement can be divided into components in a similar manner to the way MacKay himself defined complementarity.<sup>22</sup> An agent is “free” in this sense if:

F1: The outcome of their decision is up to them (unless they make the decision it will not be made).

---

20. MacKay, *The Clockwork Image*, p 110.

21. Malcolm A. Jeeves, *Psychology and Christianity: the View Both Ways*, 1st ed. (London: IVP, 1976).

22. MacKay, ‘Complementarity II’.

F2: They are in a position to make the decision.

F3: No fully determinate specification of the outcome already exists which they would be correct to accept as inevitable.

F4: They would be **able** to falsify any prediction (if only they knew it).

In developing his argument for LI from this definition he makes use of the previously developed arguments for his concept of *complementarity*, in which there is a strong correlation between the brain state and the mental state of a person.

The first step in constructing the argument is to consider a *super-scientist*,  $O$ , who is able at a particular time,  $t_0$ , by means of the cerebroscope, to obtain a description of the state of the subject  $S$ 's brain completely accurately to any desired degree of precision, without interfering with, or disturbing  $S$  in any way. This *super-scientist* also has a complete description of the correlation/ mapping between the brain and mental states for any observation of  $S$ 's  $CM(t)$ . This scenario is depicted diagrammatically in Figure 5.3.

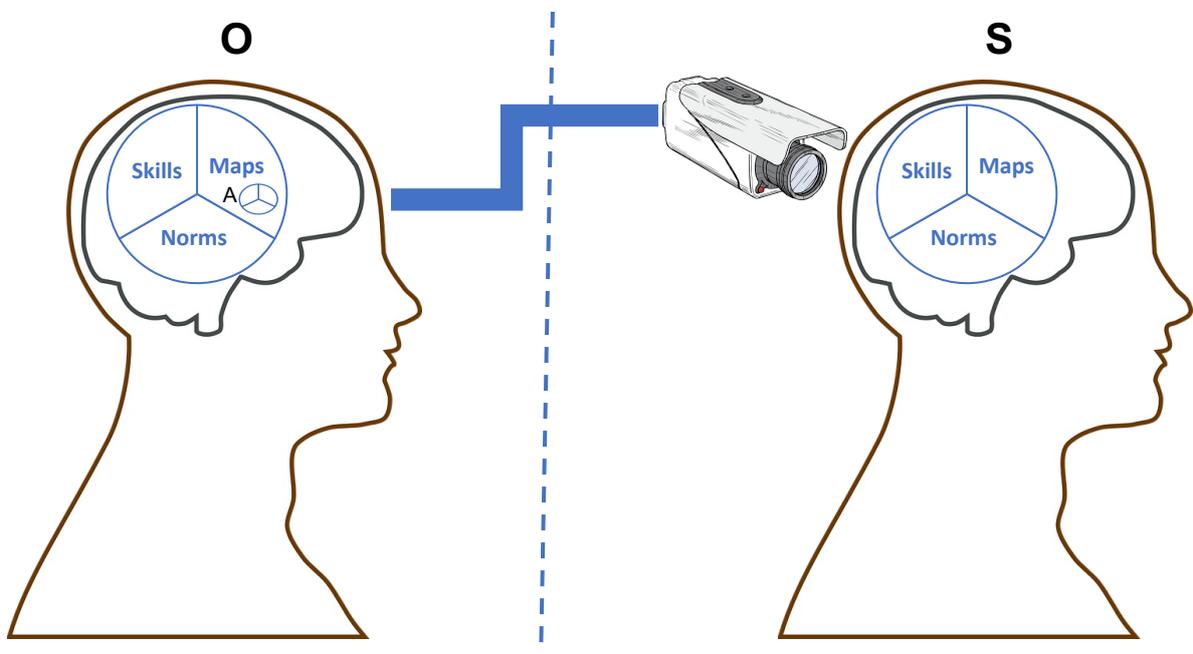


Figure 5.3: The Observer (Super-Scientist) and the Subject

Given the super-scientist,  $O$ , and the cerebroscope and the resulting specification of the brain state,  $B$ , it is tempting to think that the specification, having been observed by  $O$  is true for everyone. As it turns out this is not the case. There is one person for whom it is not true: the subject,  $S$  herself. Not only is it not true for them, but it cannot be true for them! The reason follows straightforwardly from what was said above about  $S$  trying to use the cerebroscope on themselves. In this case, although  $B$  exists for  $O$ , if  $O$  tries to communicate it to  $S$  it will change  $CM(t)$  such that its state will no longer be  $B$ , in a manner directly analogous to viewing one's own brain. Of course, at any time  $t' > t_0$   $S$  can legitimately accept that  $CM(t)$  was  $B$  at  $t$ . (The past, as they say, is a different country.<sup>23</sup>) That is, if they were presented with and told "This was your brain state  $x$  seconds ago" they would be correct to believe it. This situation is sufficient to show that there does not exist a complete specification of  $S$ 's brain state at  $t_0$  that "has an unconditional claim to the assent" of  $S$ .

Now consider the extended situation where  $O$  not only has the specification  $B$  but is also in possession of the mechanistic (deterministic) model and laws of nature whereby they are able to predict that from  $B$  at  $t_0$ ,  $S$  will perform action  $A$  at  $t_1$  (sufficiently close to  $t_0$ ). This situation may be expressed symbolically as:

$$(CM(t) = B) \supset A$$

where ' $\supset$ ' represents logical material implication.

Here it would appear that the super-scientist has good reason to consider the outcome of the prediction as inevitable, and as such that it has an unconditional claim to their assent. So far so good for a deterministic understanding. The key question then becomes: "Is this outcome inevitable for  $S$ ?" Again the counter-intuitive answer is "No!". The reason is similar to that for the specification  $B$  given above. At  $t_0$ , if  $S$  were made aware of the prediction, then the specification on which it was based would no longer be correct

---

23. L. P. Hartley, *The Go Between* (London: Hamish Hamilton, 1953).

(regardless of whether or not they believed it), hence the prediction would not be valid and the situation would be open for them. Or, to put it another way, the specification  $B$  on which the prediction  $A$  was based could not have  $S$  believing it (since the observation did not include them being informed of it) so any change in that state would render the prediction obsolete.<sup>24</sup> This arises from the notion of complementarity whereby any mental process (e.g. reflection) has a correlate in the brain state (i.e. there is an energy cost involved). Therefore for  $S$ , there is no inevitable prediction, one that has an unconditional claim to their assent until they have made up their own mind. In fact one can go further and say that there is in fact a claim to their disbelief of the prediction. This is in keeping with MacKay's definition of freedom.

If after  $t_1$ , when  $A$  has occurred,  $O$  were to present  $S$  with the complete description of the prediction,  $S$  would be quite correct at that point to believe it. This is why MacKay described it as logical relativity: the prediction true for  $O$  whilst being simultaneously undefined<sup>25</sup> for  $S$  at  $t_0$ . That is, in MacKay's terms the truth of the prediction is relative to the person looking at it.

### 5.1.2 Dealing with 'Compensation'

Having dealt with the basic scenario MacKay turned to a potential response and considers a situation in which the super-scientist is able to compensate for the deficit highlighted above. In this scenario  $O$  is able to devise and set up an experiment in which the predicted outcome is true iff  $S$  believes it as presented. In such a case MacKay agrees that  $S$  would indeed be correct to believe it. On the other hand, MacKay argues that in this case

---

24. It should be noted here that this goes beyond the mere fact of interaction changing the system. It is the nature of the interaction that is important here: the fact that it effects a particular change in the CM by the subject trying to reflect on what they would be about to do. For example, a different interaction with the subject such as saying "It's turned out nice again", would no doubt change the system, but not in a relevant way.

25. It is "undefined" rather than "false" because  $S$  may still be disposed to carry out the action. It *may* be something  $S$  had a strong desire to perform on other grounds.

they would not be incorrect to disbelieve the prediction; because then their disbelieving it would again render the prediction (logically) incorrect, and hence the decision would be up to  $S$ .

One peculiarity that arises from MacKay's discussion of the putative counter-example is that it is not the counter-example with which I would have expected him to deal.<sup>26</sup> Consider again the situation where  $O$  is observing  $S$ 's brain state and devises an experiment whereby they identify a proposition,  $p$ , which will be believed if presented to  $S$ . Having identified and set up the appropriate experimental conditions  $O$  carries out the experiment and presents  $S$  with the prediction  $B_p$  and as predicted  $S$  believes  $B_p$ . Is  $S$  correct to believe  $B_p$ ? Yes, of course, since that is the prediction, and it is believed.

Now, this scenario is sufficiently close to the one that MacKay did deal with that one can imagine that he would again pose the question: "Would  $S$  be incorrect to disbelieve  $B_p$ ?" And again the answer is that *logically* they would not be incorrect to do so. One might now think we have arrived at the same point as before, but curiously we have not. What this example shows is that there is a distinction between what one would be *correct* to believe and what one is *able* to believe. MacKay has up to this point focussed on the logic of the situation, but one part of his definition of freedom (in common with other definitions) is F4:  $S$  must be *able* to falsify the prediction. In this particular case that cannot happen on pain of contradiction.<sup>27</sup> So it seems to me that this example provides

---

26. In fact, so obvious did I consider the objection that I thought it is what MacKay *was* dealing with. And so I had some difficulty in understanding his solution. It was only when I realised that he was dealing with a completely different example did I see what he was getting at. However, now it is not obvious that what he is addressing was the thing put forward as a counter-example. It is not clear if this is one that MacKay has concocted or if it is a misunderstanding of the one I put forward here.

27. To illustrate the type of proposition that I have in mind, consider the following rather trivial scenario. If  $O$  were to observe my brain state just before I have a hotel breakfast, they would be able to predict that I would have the full English, but without beans. If they were to tell me of this prediction I would believe it (since there is no way I would have beans with a full English). This illustration merely serves to show that it is possible to provide a prediction that would be believed and be correct; it does not demonstrate the 'locked in' nature of the prediction.

a strong counter-example to LI as presented by MacKay<sup>28</sup>.

## 5.2 Criticism and Defense

MacKay, at the end of his life could state that he had been defending this view for forty years and that it had stood up to criticism.<sup>29</sup> In this section we will look at the kinds of criticism that had been levelled against LI that allowed MacKay to say this, and in the following section I shall explore a novel criticism and propose a solution that will both resolve the problem and update LI. For a more detailed exposition of the criticisms and MacKay's replies see chapter six of Norman's book.<sup>30</sup>

In assessing a critical dialogue there are two things to be considered: 1) has the critic understood the argument? And 2) has the author understood the criticism? Each of these does not necessarily have a binary (yes or no) answer, which can complicate things when trying to identify who is right and under what circumstances. Some are more clear cut than others. It isn't always easy to discern where the problem lies.

Criticism of LI can be grouped in two categories: those that completely miss the point in one way or another and those that make interesting points which move the discussion forward to various degrees (even if it is only to make MacKay clarify things), which may have resulted in the interlocutors talking past one another. There is at least one which made an interesting contribution, but with which MacKay did not engage (probably because he was unaware of it). Norman, in the aforementioned book, gives a comprehensive exposition of the dialogue between MacKay and his critics, so I shall

---

28. This highlights the distinction between what is logically possible and what is physically possible in this world, something that was touched on by Hasker in his criticism: William Hasker, 'MacKay on being a responsible mechanism: Freedom in a clockwork universe', *Christian Scholar's Review* 8 (1978): 130–140 and by Plantinga in general terms: Plantinga, 'On Ockham's way out'

29. MacKay, *Behind the Eye*.

30. Norman, *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922–1987*.

simply provide a summary of the points as they bear on my programme.

Those in the first category can simply be mentioned in passing since they do not add anything to the discussion. The misunderstandings are many and varied: conflation of the I-story and the O-story so as to make it look like the Stoic view,<sup>31</sup> seeing it as an attempt to revive the medieval ‘two fold view of truth’,<sup>32</sup> confusing freedom and unpredictability,<sup>33</sup> equating it with speed of computation,<sup>34</sup> that future brain states are uncaused,<sup>35</sup> and that LI is inherently self contradictory.<sup>36</sup> MacKay’s responses make short shrift of these.<sup>37</sup>

The second category can be represented by Williams.<sup>38</sup> In a brief exchange with MacKay in the journal *Analysis* he takes issue with what he sees as logical problems in LI as presented by MacKay in his paper ‘On the logical indeterminacy of a free choice’<sup>39</sup> (hereafter LIFC). Williams contrasts LI with propositions such as “[S] is mistaken in thinking *p*” which cannot be believed by *S* on pain of contradiction. MacKay<sup>40</sup> accepts the analogy but highlights that the proposition can be assumed and accepted, in the past tense, by it having the effect of changing *S*’s mind, which is perfectly acceptable. But that does not parallel what happens in the case of LI. As MacKay points out, informing

---

31. Donald M. MacKay, ‘Free will and causal predictions (Discussion)’, in *Cross Cultural Understanding: Epistemology in Anthropology*, ed. F. S. C. Northrup and H. Livingston (New York: Harper. & Row, 1964), 356–364.

32. Clark, *Behaviorism and Christianity*.

33. J. McDermott, ‘I’m free because I don’t yet know what I’m going to do’, *British Journal for the Philosophy of Science* 23 (1972): 343–346.

34. I. J. Good, ‘Free will and the speed of computation’, *British Journal for the Philosophy of Science* 22 (1971): 48–49.

35. I. Thalberg, ‘New light on brain physiology and free will?’, *British Journal for the Philosophy of Science* 21 (1971): 379–383.

36. L. W. de Witt, ‘The hidden assumption in MacKay’s logical paradox concerning free will’, *British Journal for the Philosophy of Science* 24 (1973): 402–405.

37. MacKay, ‘Choice in a mechanistic universe: a reply to some critics’; MacKay, ‘The logical indeterminateness of human choices’.

38. C. J. F. Williams, ‘Logical indeterminacy and free will’, *Analysis* 21 (1960): 12–13; C. J. F. Williams, ‘Comment on Professor MacKay’s reply’, *Analysis* 22 (1961): 84–85.

39. MacKay, ‘On the logical indeterminacy of a free choice’.

40. MacKay, ‘Logical indeterminacy and free will’.

$S$  of the situation does not and cannot resolve the issue, since  $B$  does not exist for  $S$ , hence they would not be correct to believe it. The one benefit of the exchange was to make MacKay elucidate the distinction between his use of ‘true’ and ‘valid’, which was not clear in LIFC.<sup>41</sup> The discussion also caused him to further explain the nature logical relativity on which LI relies<sup>42</sup>.

To call it ‘valid’ for isolated observers, and ‘logically indeterminate’ for the agent – until after the event – offers I think a useful way of reserving ‘true’ for those propositions that do fulfil the dictum.<sup>43</sup>

Where the ‘dictum’ here referred to is that if a proposition “is true for anybody it is true for everybody.”<sup>44</sup>

As was the case with Williams, Watkins<sup>45</sup> reacts to the apparent ‘relativism’, as he sees it, in MacKay’s position. Watkins is an indeterminist in the Popperian sense<sup>46</sup> and agrees with MacKay’s final conclusion regarding the indeterminism of a free choice. But he does not like the idea that statements can be true for one person, in this context, but not for all. He therefore proposes to improve and strengthen MacKay’s position by making the

---

41. MacKay, ‘On the logical indeterminacy of a free choice’. This distinction, while potentially clear, can still cause confusion in this context, as I suspect it has. MacKay claims to be making a ‘logical’ point; but in logic a proposition is ‘valid’ iff it is true always and everywhere (i.e. it is a tautology). This is due to the *Deduction Theorem* whereby a valid argument can be turned into a valid proposition by creating a conditional with conjunction of the premises as the antecedent and the conclusion as the consequent.

42. Donald M. MacKay, *Freedom of Action in a Mechanistic Universe*, The Eddington Lecture (Cambridge: CUP, 1967), p 22–27(hereafter FAMU.)

43. MacKay, ‘Logical indeterminacy and free will’, p 83.

44. Williams, ‘Logical indeterminacy and free will’, p 13. It should be noted that in this and subsequent criticisms to which MacKay gave a response, it was not a case of ‘all or nothing’. MacKay at various points acknowledged sympathy with his critics position and understanding, and even agreed with some of their points (though was generally because he saw the point made as not being in conflict with his thesis).

45. Watkins, ‘Freedom and predictability: an amendment to MacKay.’

46. Popper, ‘Indeterminism in quantum physics and in classical physics, I’.

outcome a universally true proposition. He does not succeed in this goal: most of the paper is taken up with example scenarios which are peripheral to MacKay's argument (e.g. scenarios in which a third party who is monitoring the experiment could circumvent things and communicate with *S* and with which MacKay is in agreement). But he does recognise, at least in part, the role of the conditional in the prediction; though does not press it home, which suggests that he has not really grasped its importance. However, though MacKay does not agree with his analysis he does appear to make one important concession:<sup>47</sup>

[*S*] (in the case I envisaged) has no reason to deny that there exists a prediction which the distant observers are correct to believe, both as to the outcome of his choice and as to what he will believe at the time. If [*S*] thought he had the power to falsify their secret expectations, then (*ex hypothesi*) he would be deluding himself (LIFC, p. 36; FAMU, pp. 16, 20).

MacKay of course does not see this as a concession and considers that his original position remains intact.

The final major interaction MacKay had with critics was an exchange in *Christian Scholar's Review* with William Hasker.<sup>48</sup> Hasker is an incompatibilist who considers that if deterministic brain theory is true then human freedom and responsibility is false. In this regard the exchange does not change his mind. The discussion consists of three papers. In the first<sup>49</sup> Hasker provides a criticism of MacKay's complementarity and LI, which also contains several of the usual misunderstandings which MacKay corrects in this reply.<sup>50</sup> He does manage to get MacKay to give a clearer, though idiosyncratic, explanation of

---

47. MacKay, 'Choice in a mechanistic universe: a reply to some critics', p 279.

48. Hasker, 'MacKay on being a responsible mechanism: Freedom in a clockwork universe'; Donald M. MacKay, 'Responsible mechanism or responsible agent: a reply to William Hasker', *Christian Scholar's Review* 8 (1978): 141–148; William Hasker, 'Reply to Donald MacKay', *Christian Scholar's Review* 8 (1978): 149–152.

49. Hasker, 'MacKay on being a responsible mechanism: Freedom in a clockwork universe'.

50. MacKay, 'Responsible mechanism or responsible agent: a reply to William Hasker'.

what he means by “unconditional claim to the assent”: “Would a MacKay-believing-this be correct? Would a MacKay-disbelieving-this be incorrect? If and only if the answer to this is “yes” to both the claim to my assent is unconditional.”

There is however, one criticism that does appear to hit the target: he proposes a counter-example wherein *S* is provided with the prediction, *P*, which includes the prediction that they will believe *P*. MacKay addresses this<sup>51</sup> by pointing out that even accepting the counter-example, this does not undermine *S*'s freedom because in the “court of logic” their disbelieving it would render the prediction false. This response does not impress Hasker. In his final paper in the exchange<sup>52</sup> he thanks MacKay for correcting him and clarifying things, but thinks this simply strengthens his position. With regard to MacKay's response to his counter-example he argues that this really sets things up such that there is no scenario that could satisfy MacKay's requirements for “unconditional assent.” The final critical analysis leads Hasker to conclude that LI reduces to a tautology, which is uninformative and uninteresting because “nothing follows from a tautology except another tautology”.<sup>53</sup> Actually this conclusion is not totally dissimilar to what MacKay aims to get across, that LI leads to the position that the future is open for *S* until they make up their mind. That is MacKay isn't aiming for anything to follow from the ‘tautology’; it is the outcome of his argument. It is interesting that two philosophers can reach similar end points but see them as supporting diametrically opposed positions.<sup>54</sup> It is also a pity that the debate stopped there, but given that MacKay continued to believe that his arguments had stood up to all criticism it is not clear that he fully grasped the force of Hasker's criticism.

---

51. MacKay, ‘Responsible mechanism or responsible agent: a reply to William Hasker’.

52. Hasker, ‘Reply to Donald MacKay’.

53. Ibid.

54. This reminds me of an anecdote. A Bishop and a Curate are walking down a street and observe two people engaged in a heated argument, shouting at each other across the street from the upstairs windows of their respective houses. (The houses were the old tudor type where the upstairs hung out over the street.) The Bishop turns to the Curate and says, “It is impossible for those two to reach agreement.” “Why is that Sir?” asks the Curate. “Because,” replies the Bishop, “they are arguing from different premises.”

As one might expect MacKay did not interact with every analysis of his work, and was probably unaware of some. One interesting discussion is provided by C. Stephen Evans.<sup>55</sup> Evans, after providing a reasonably clear outline of MacKay's position then declares that there are two ways to interpret his argument. The first he sees as simply a version of the compatibilist/ soft determinist description of freedom such that if one's desires or beliefs were different then so would be one's actions<sup>56</sup> This would fit with MacKay if only F1 and F2 were in view, so it does not provide a complete understanding of LI. However, he then states: "But whether the change will occur is in fact determined, and so is the resulting behaviour".<sup>57</sup> This is precisely something that MacKay denies. The effect of communication, for MacKay, does not necessarily change the output behaviour, it simply makes it open/ indeterminate.

The second interpretation is to view it "as establishing that there is no logical specification of a person's beliefs about a subject for which he has not made up his mind which any person would be correct to accept".<sup>58</sup> This appears to be closer to MacKay's actual view (though who the "any person" is is not clear). But he then goes on to expand this by saying: "The person's future belief is really indeterminate, since any prediction about his own belief which might make, or become aware of might change that belief".<sup>59</sup> Close, but no coconut. Again Evans diverges from MacKay, but this time the reflective nature of the interpretation suggests a "reasons responsiveness" approach to freedom on this interpretation.<sup>60</sup>

Neither of these interpretations are ones MacKay would accept; but it is curious that the one that is closer, the second, is the one Evans thinks is further away.

---

55. C. Stephen Evans, *Perserving the Person*, 1st ed. (London: IVP, 1979).

56. see for example Beebe, *Free Will: An Introduction*, ch 2

57. Evans, *Perserving the Person*, p 114.

58. Ibid.

59. Ibid.

60. Fischer and Ravizza, *Responsibility and Control: a Theory of Moral Responsibility*.

### 5.3 A Further Criticism

I have sought to present MacKay's arguments for, and explanation of, LI as accurately as I can. I have also acknowledged that the criticism he had to deal with during his lifetime (as presented in the previous section) mostly failed to hit the mark. As noted, this enabled him to say in his Gifford lectures and final publication that logical indeterminism had survived more than thirty years of scrutiny and he was confident of its correctness.<sup>61</sup>

However, notwithstanding these acknowledgements, it strikes me that there are some issues that seem to undermine its cogency in its current form, and that have not been presented before. At the very least the argument is not as precise as it might be. Two key terms in particular form the focus of this discussion as they serve to highlight the problem. The two terms are "unconditional claim to the assent" and "inevitability".

These terms are related (even closely related) but in order to get a clearer picture I shall discuss them separately at this point. Looking at the former phrase first, this needs some unpacking. There are actually very few things that can be said to have an "unconditional claim to the assent." Basically these are the *necessary* propositions: things that are true in all possible worlds.<sup>62</sup> For example, tautologies would qualify but not much else; in particular scientific statements do not have this property. The example MacKay gives as being something that has an unconditional claim to everyone's assent is: "The sun will set at a particular time." Now what MacKay means here is that this is something that will happen regardless of whether we "like it or not" or "believe it or not."<sup>63</sup> It is not something we can do anything about.<sup>64</sup>

However, there are several problems here. At the very least, as noted, it requires an

---

61. MacKay, *Behind the Eye*.

62. Under the Kripke semantics

63. MacKay, *Behind the Eye*, p 193.

64. He even places it outside the bounds of Popper's account of indeterminism in classical physics since our influence over it is negligible. MacKay, *Information, Mechanism and Meaning*, p 153

unusual definition of the term “unconditional.” But being a phenomenal statement it is actually conditional on a number of factors. At the ridiculous end of the spectrum one could say that it assumes that there is no Vogon Constrictor Fleet nor Death Star in the vicinity. Less ridiculous, though probably still quite unlikely at present, it assumes that the eschaton will not occur. But most mundanely, as stated it is geospatially conditioned (and hence not unconditional); that is, if I state that the time of sunset is 5:41pm, that is not sufficient to allow one to decide its truth.<sup>65</sup> Of course it is not too difficult to re-interpret what MacKay is saying to mean the rotation of the earth every 24 hours or so. Indeed there is nothing we can do about that. But the recognition that the earth rotates came relatively late to being accepted scientific dogma and our observation of the associated phenomenon (the sun appearing over the horizon) is geo-spatially conditioned. However, if we simply drop the “unconditional” part and say “claim to the assent” where this claim is understood to be conditional on the circumstances of the observation, then we may move forward.

The other term of interest is “inevitable.” This is a modal term; and should be analysed in the context of Modal Logic. The logic of modality deals, in its most basic form, with the logic of *necessity* and *possibility* (i.e. with statements of the form “it is necessary that ...” or “it is necessarily the case that ...,” and “it is possible that ...”). The attempt to deal with modal concepts has a long history, going back as far as Aristotle. In the medieval period there were several attempts to the develop a suitable logic to handle it, but it was not until modern symbolic logic became established that real progress was made. During the 20<sup>th</sup> century there were a number of systems developed, several of the most commonly used being due to C. I. Lewis.<sup>66</sup> However, it was only after David Lewis<sup>67</sup> and Saul Kripke<sup>68</sup> introduced the “possible worlds interpretation” in the 1970’s that interest grew significantly and applications began to appear. There are now a number

---

65. For example, I used this time on 29th October 2022 during a talk I gave in Birmingham. Everyone was happy to accept the statement as true until I informed them that I was talking about the time of sunset in Livingston, not Birmingham.

66. W. C. Kneale and M. Kneale, *The Development of Logic* (Oxford: OUP, 1962).

67. David Lewis, *Counterfactuals* (Oxford: Blackwell, 1973).

68. Saul Kripke, *Naming and Necessity* (Oxford: Blackwell, 1981).

of different modal logics to deal with different modal contexts. For example, those dealing with belief: doxastic logic;<sup>69</sup> knowledge: epistemic logic;<sup>70</sup> obligation: deontic logic<sup>71</sup> etc. In this context the original modal logic is sometimes referred to as ‘alethic modal logic’.<sup>72</sup> In what follows we shall make use of the possible worlds approach. In this context a *world* is a state of affairs, or scenario. (Although Modal Logic is not generally truth functional, the simplest example of a possible world would be a line in a truth table.)<sup>73</sup>

This is the setting in which we can explore “inevitable”: to say that something is inevitable is to declare that it is necessarily the case that it will occur<sup>74</sup> (thereby placing within the domain of alethic modal logic).<sup>75</sup> To say that something is necessarily the case is, following the Kripke semantics, that it is true in every possible world. There is a fallacy that can arise in this context, one that was noted at least as far back as Aquinas: that is to conflate the “necessity of the consequent” with “the necessity of the consequence.” This arises in the context of a conditional proposition (e.g. if B then A, where B is the brain state (that is, the state of  $CM(t)$ ) and A is an action). If we say in ordinary language:

“If P then necessarily Q”

---

69. E. J. Lemmon, ‘Is there only one correct system of modal logic?’, *Aristotelian Society Supplementary* 33 (1959): 23–40.

70. Ronald Fagin et al., *Reasoning about Knowledge* (Cambridge, MA: MIT Press, 1995).

71. R. Hilpinnen, *Deontic Logic: Introductory and Systematic Readings* (Dordrecht: Reidel, 1981).

72. Rod Girle, *Modal Logics and Philosophy*, second (Durham: Acumen, 2009).

73. Modal Logic, from the late 1970’s on was used (increasingly) in the Philosophy of Religion, particularly through the work of Alvin Plantinga and his colleagues: Alvin Plantinga, *The Nature of Necessity* (Oxford: OUP, 1974). While it is a very useful way to present LI, given that it did not really take off until towards the end of MacKay’s life it should be no surprise that he did not make use of it (but then neither did any of his critics/ interlocutors, though some of Hasker’s criticisms fit with Plantinga’s expositions.

74. MacKay’s use of the term bears a strong similarity to van Inwagen’s modal operator ‘*N*’, though contrasted by the fact that it is used to support a compatibilist stance.

75. MacKay did sometimes express it in a way that covered more than one type of modal logic: “No completely up to date or predictive specification of that agent’s state of conditional readiness exists unknown to him, which has for him an unconditional claim to assent, i.e. such that if only he know it he would be correct.” MacKay, *Behind the Eye*, p 114 Here we have a single statement that appears to cover: alethic, doxastic, epistemic and deontic logics. However dealing with one modality is hard enough, so we will stick to simply applying alethic logic.

to what does the “necessarily” adhere? Consider a formal representation of this conditional. Let  $\Box$  stand for “necessarily,”  $P$  and  $Q$  be propositional variables and  $\supset$  the relational symbol for “If ... then ...,” as before.

If we did a straightforward literal interpretation, we might think it should be expressed formally as:

$$P \supset \Box Q \tag{5.1}$$

However, in the possible worlds semantics that would mean: if  $P$  is true in one world, then  $Q$  is true in every world, which would be a pathological situation. In fact the expression should be written as:

$$\Box(P \supset Q) \tag{5.2}$$

What this version says is: it is true in every world that if  $P$  is true in a particular world then  $Q$  is true in that same particular world, which is a perfectly reasonable interpretation (and is a commonly used means of formalising strict implication). To conflate these two is known as the *Modal Fallacy*.<sup>76</sup>

I noted earlier that there is a relationship between “unconditional claim to the assent” and “inevitable,” and this is it: Equation 5.2, being necessary, does have an unconditional claim to the assent of everyone.

Returning now to MacKay’s presentation of logical indeterminism and how he uses the term “inevitable.” It is not always clear to what he is referring, but in those places

---

<sup>76</sup>. A less ambiguous expression that would remove the temptation to make this mistake is “Necessarily, If P then Q.”

that are most clear he refers to the output of the experiment (i.e. the action  $A$ ). For example:

The present and immediately future state of your brain, however predictable by a detached observer, has *no completely determinate specification* that you would be unconditionally correct to accept, and in error to reject, if only you knew it. In that sense your immediate future is not inevitable for you.<sup>77</sup>

This gives the impression, from what has been said above, that the modal fallacy is lurking in the vicinity. MacKay wants  $A$  to have an unconditional claim on  $O$  but not on  $S$ . However, that would only be true if  $B$  simply occurring once made  $\Box A$  the case (i.e. inevitable and with an unconditional claim, which is the modal fallacy).

Recognising this fact has a detrimental effect on MacKay's argument. Consider  $\Box(B \supset A)$ . In this scenario the proposition has an unconditional claim to the assent of everyone including  $S$  because  $B$  is the antecedent of the conditional and so  $S$  can accept that if their  $CM(t)$  were in state  $B$ , then  $A$  would follow. (And that despite the fact that there is no specification of  $B$  that  $S$  would be correct to believe simultaneously with their being in brain state  $B$ ).

On the other hand, for the reasons given above, the inevitability of the outcome/prediction  $A$  (i.e.  $\Box A$ ) does not have a claim to the assent (unconditional or otherwise) of anyone (including the super-scientist  $O$ ). These considerations are sufficient to demonstrate the fallacious nature of MacKay's presentation of logical indeterminism.

The great thing about a fallacious argument is that it does not necessarily result in a false conclusion, just that the conclusion does not follow from the premises. So the question to be addressed in the next section is whether a more robust version of the argument can be constructed by means of modal methods? One thing that remains true

---

77. MacKay, *The Clockwork Image*, p 79.

is that there is a logical relativity for  $O$  and  $S$  with respect to the specification of  $S$ 's  $CM(t)$ , and that is the key to such an argument.<sup>78</sup>

## 5.4 A Proposed Solution

In developing a possible solution to these problems, the first issue to address is the terminology used. If it is the case that the problems are merely presentational then if we tighten things up things should improve. To that end the term *unconditional* should be dropped from the discussion or at least restricted to things that are demonstrably “unconditional” in a standard way. In what follows we will treat the term *inevitable* as a modal operator and a short form for “it is necessarily the case that” and utilise it as a case of alethic necessity.

Returning to the original situation, one thing that is incontrovertible is that no complete specification of the brain state,  $CM(t)$ , of  $S$  at  $t$  can exist such that  $S$  would be correct to believe it and incorrect to disbelieve it. This is the formulation from which to build a more robust version of the argument for LI. A second thing that is unassailable in a fully deterministic universe where mind/ brain complementarity holds is the necessity/ inevitability of the action  $A$  following from the brain state  $B$  (i.e.  $\Box(B \rightarrow A)$ ). Both of those, in this context, and only those, have an unconditional claim to assent. And they have this claim for all people, including  $S$ . The rest follows straightforwardly from this.

We have, for the world in which there is no communication (i.e. where only  $O$  is privy to the information regarding the brain state)  $CM(t) = B$  observed as being the case by  $O$  (call this world  $\omega_o$ ). Then from (2) and Modus Ponens we have  $A$ . In fact, if one accepts “accidental necessity,”<sup>79</sup> then since  $B$  is observed as being the case at  $t$ , then for any time

---

78. Actually I have allowed MacKay too much leeway above: in fact even the fallacious case does not give the prediction unconditional assent. In  $B \supset \Box A$ , although  $A$  is true in all possible worlds, that outcome is still conditional on  $B$  being true in one possible world.

79. This is based on the fact that once an event occurs, or something is observed to happen, then there

$t' \geq t$ ,  $\Box B$  is true and again by Modus Ponens,  $\Box A$ . Then in this world,  $w_o$ , under that particular situation, the prediction is inevitable and has an unconditional claim to the assent of everyone including  $S$ .<sup>80</sup> Now someone may wish to argue that this does not deal with MacKay's contention that this prediction does not have a claim to  $S$ 's assent "if only they knew it." For this we need to examine the situation in the world where  $S$  is informed of the observation at  $t$  (call this world  $\omega_i$ ). In  $\omega_i$   $B$  does not exist for  $S$  at  $t$  and so all we can say in this world is  $\neg B$ . That being the case there is no definite deduction that can be made from (2) and  $\neg B$ . That is, both  $A$  and  $\neg A$  are possible at  $t$  in  $\omega_i$ ; so the only conclusion possible is the general one:  $(\Diamond A \ \& \ \Diamond \neg A)$ ,<sup>81</sup> where " $\Diamond$ " is the symbol for "it is possible that ...". Hence, at  $t$  the future remains open for  $S$  in  $\omega_i$ . We can go further, as we did for  $O$  in  $w_o$ . Here, because  $B$  does not, and cannot, exist for  $S$  in  $\omega_i$  there is no situation where it is not the case that the future is open for  $S$ . That is, it can be argued that in  $\omega_i$  the future is open for  $S$  of necessity  $(\Box(\Diamond A \ \& \ \Diamond \neg A))$ .<sup>82</sup>

There are several things that may be noted about this conclusion. The first is that by utilising a modal approach we can capture the notion of logical relativity by identifying the propositions as being *true at a world*. This enables us to express the distinction MacKay was making between "true" and "valid" in a manner that is more in keeping with standard usage of these terms. The second is that  $(\Diamond A \ \& \ \Diamond \neg A)$  is a formal statement of PAP.<sup>83</sup> We then see that PAP is not an assumption of LI but it "falls out" as a conclusion of the modal version of LI. Next, this is a compatibilist position, but of a particular kind. The indeterminism in question is not such as requires that the indeterminism be apparent 

---

is putatively nothing that can be done to change it: it is true for everyone from that time on, see for example Plantinga, 'On Ockham's way out'.

80. This can be viewed informally as the difference between  $O$  saying to  $S$ , "You are in brain state  $B$ " which may be true at  $w_o$ , but false at  $w_i$  (the world in which the brain state is directly communicated) and then saying: "I have observed you to be in brain state  $B$ ," which is true at both worlds.

81. Note the conjunction, unlike the disjunction in the Hasker exchange. Both possibilities are true at the same time without contradiction.

82. And this outcome is also true for  $O$  at  $w_i$ .

83. Technically it is a statement of contingency, sometimes written as  $\nabla A$ , see Girle, *Modal Logics and Philosophy*, p 4, but in the current context that contingency relates to the openness of the future, with regard to alternate possibilities.

in all situations, rather it only needs one situation to be indeterminate to work. Finally, contra Hasker, this outcome,  $(\Diamond A \ \& \ \Diamond \neg A)$ , is not a tautology.

Having reconstructed LI in modal terms above, we can now summarise the outcomes:

- Physical determinism is preserved in all relevant worlds, where relevant here means the problem situation is specified at an appropriate level of precision.
- In world  $\omega_o$  determinism holds and predictions are assured for everyone.
- In world  $\omega_i$  indeterminism holds because  $B$  (the brain state of the subject) does not exist for anyone (on pain of contradiction).

Given that the above is sound the new version of LI achieves what List was aiming for and as such it qualifies as a form of *Compatibilist-Libertarianism*.<sup>84</sup>

## 5.5 Predestination

MacKay had a robustly Reformed view of God's sovereignty; what he called a "tough minded concept of God as the author of all that is,"<sup>85</sup> and he distinguished his view from what he considered the weaker view of such theologians as John Habgood.<sup>86</sup> MacKay makes the point that one should not see God's actions with respect to his creation as causal (at least not in the sense that that term is used in physics and control theory). He expresses this by means of a quote that he attributes to Aquinas: "God's knowledge is the cause for the future."<sup>87</sup> It was noted in Chapter 3 that MacKay's view of the relation between Science and Theology was hierarchically complementary. In the current case that

---

84. List, *Why Free Will is Real*.

85. MacKay, *Behind the Eye*, p 209.

86. John Habgood, *A Working Faith* (London: Darton, Longman / Todd, 1980).

87. MacKay does not give a citation for this quote. The nearest I can find is "*scientia dei est causa rerum*" "The knowledge of God is the cause of things." Thomas Aquinas, *Summa Theologica, Part one*,

complementarity is not that of brain and mind, as it was in our discussion of LI in the previous section. Here God-as-Author, in His works of Providence “upholds all things by His powerful word” (Heb. 1:3 ESV) moment by moment<sup>88</sup> and as such is “his most holy, wise, and powerful preserving and governing all his creatures and all their actions.”<sup>89</sup> All this is a preamble to the modified version of LI that comes into play when considering God’s sovereignty and human freedom. As one would expect, MacKay’s views are equally robust regarding predestination:

Thus on the one hand it seems to me biblically undeniable that God as Creator is sovereign in every twist and turn of every man’s daily life. In the end of the day, according to the whole tenor of the Bible, it will have to be said in one sense of every creature’s course: ‘whereunto also he was appointed’ (1 Pet. 2.8). No speculations in terms of ‘one-way’ predestination (denying predestination to eternal death, though admitting predestination to eternal life) give a remotely plausible exegesis of such passages as Rom. 9.18 (... whom he will he hardens) ; I Pet. 2 .8, 9, Rom. 1 1. 7, 8 (... but the rest were hardened ... ) ; nor do they offer an intellectually consistent theology of divine sovereignty. Our argument will be that all such watering down of the biblical doctrine is not only incoherent, but also totally unnecessary for the purpose in view.<sup>90</sup>

That is, God-as-Author brings it about that you will perform action *A* such that it

---

*Question 14, Article 8* (Library of Alexandria, 1845). But since the future, from God’s perspective would be included in ‘things’, this may be to what MacKay is referring. Of course Aquinas’ use of the term ‘cause’ is Aristotilian, whereas the use of the term to which MacKay objects is post-Newtonian.

88. The similarity between how MacKay phrases things and Occasionalism (Nadler, *The Cambridge Companion to Malebranche* ch.5) has not gone entirely unnoticed. John Garvey, ‘The Real MacKay’ has commented on this though he does not think MacKay is actually an occasionalist. It is however an interesting observation given the recent interest in occasionalism and its espousal, albeit in a weaker form, by Plantinga, ‘Law, cause and occasionalism’.

89. Westminster Shorter Catechism Q. 11.

90. MacKay, ‘The sovereignty of God in the natural world’, p 21.

is not based on physical determinism, (since God-as-Author could create a sequence with no discernible physical cause). Here MacKay is very clear that one should not confuse divine sovereignty with theories of physical determinism. This gives rise to the question of whether in this situation, as opposed to the previous one of physical determinism, *S* would be correct to believe that they would perform action *A*. As one might expect MacKay says that the answer to this is again “No”. The reason is the same as before: although God may bring it about that you are in state  $CM(t) = B$ , if you were told of this you would no longer be in state *B*.<sup>91</sup> As MacKay puts it “the character who believed it would not be the same character about whom the story was written.”<sup>92</sup> All this falls out because regardless of whether it is a physical or metaphysical context it remains true that there is no complete specification of your *CM* that you would be correct to believe and incorrect to disbelieve: it still simply does not exist for you. MacKay does not explicitly state it, but in this case we assume that there is a *rational* connection between the beliefs one has and the actions that one performs. That is, neither God nor *S* behave in a capricious manner.<sup>93</sup> Of course if one posits a scenario where it is irrelevant what  $CM(t)$  is and God simply ‘brings it about’ that you perform *A*, then all bets are off.

If then, we accept MacKay’s argument here as paralleling his argument for LI in the case of physical determinism, it will be no surprise that the criticism of LI in that context will be paralleled by criticism here. Again we will have to address what it means for an action to be ‘inevitable’ and what *S* is correct to believe. I shall assume that the context of discussion is that of rational discourse and expectation. That is, what a person believes will lead to certain other beliefs and actions (that is the import of such passages as Jas. 2:14 - 26). So mirroring MacKay’s argument we can say:

---

91. It should be noted that as with the discussion of LI above in Section 5.4 it is not just any interaction that affects things. It is communication of what the subject is about to do that affects things. Communicating some vacuous piece of information such as “It’s turned out nice again” would make no more relevant difference to the outcome than my jumping up and down would make on the rotation of the earth.

92. MacKay, *Behind the Eye*, p 210.

93. This is in the spirit of the Westminster Confession of Faith, chapter III.1 “. . . nor is violence offered the will of the creatures; nor is the liberty or contingency of second causes taken away, but rather established.”

$$CM(t) \rightarrow A$$

Or

$$CM(t_1) \rightarrow CM(t_2)$$

And

$$CM(t_1) \rightarrow A(t_2)$$

Where  $t_2 \geq t_1$ , and reflects the immediate future of  $S$ . The rest follows straightforwardly from this and the previous arguments. Just as MacKay says, the person whose state was determined as being  $CM(t)$  is not the same as the person who was informed of  $CM(t)$ . So we can say that the world in which the predestination of  $S$ 's immediate future is accurate, is not the same world in which  $S$  is informed of  $CM(t)$ ; and so we have again that the prediction is *true at a world*. This preserves the notion of freedom previously discussed and so even in the context of God's sovereignty the challenge of "Tell me what I am going to do in my immediate future!" reveals that in that world the future is still open and hence not inevitable for  $S$ . This again provides an example of PAP that does not violate God's sovereignty. MacKay thought that LI was a solution to the division between Calvinism and Arminianism,<sup>94</sup> and just as in the previous section we identified it as being a form of Compatibilist-Libertarianism, here it may well be a contender for the title of *Calvinist-Libertarianism* which Crisp aims for in his publications,<sup>95</sup> although unlike his, this is a compatibilist solution.

---

94. MacKay, *The Clockwork Image*, p 110.

95. Crisp, 'John Girardeau: Libertarian Calvinist'; Crisp, *Deviant Calvinism*; Crisp, 'Libertarian Calvinism'.

# Chapter 6

## Agents in Dialogue

Most, if not all, other discussions of free will and determinism focus on the freedom of the individual as a single agent, but MacKay's reflections on the cerebroscope experiments led him to consider further what might happen if the system under consideration were not simply a single agent, but rather two (or more) agents in dialogue.<sup>1</sup>

In this chapter we shall look at how MacKay extended LI to apply to dialogical situations, including how he used his findings to suggest that God must be multi-personal. We will also discuss how LI can be upheld in the context of prophecy, especially prophecy of soon to happen events such as Peter's denial.

---

1. While strictly speaking "dialogue" refers to two agents in conversation, and that is what people generally think of in the first instance, the term has now become a commonplace for conversation between any, manageable, number of agents. Hence MacKay made it clear that while the theory was worked out with respect to two agents, it was applicable to three or more. MacKay, *Behind the Eye*, p 151

## 6.1 Coupled Agents

In extending LI to agents in dialogue he again assumes that determinism is true, and that both agents are “super-scientists.” That is, all parties can use a cerebroscope to observe the CM of the others (but not their own). In the simplest case involving two agents, this forms a figure of eight type relation, as shown in Figure 6.1, wherein each agent is “locked in” to the system. The key thing to observe about this situation is that each agent has, or attempts to have, a map of the other agent’s CM. However, in so doing they will also end up attempting to obtain a map of their own CM, since that will form part of the CM of the other agent (also depicted in Figure 6.1). Obviously, for the same reason as in the single person case, this cannot happen. The upshot of this is that neither agent can possess complete information of the system as a whole.<sup>2</sup> That is, by analogy with the single person case, no specification of the system as a whole exists for either party.<sup>4</sup> Hence this dialogical situation behaves as a single (coupled) system. As with the single person case this much seems incontrovertible. The obvious follow on is to recognise that a third party “super-scientist” who is not in communication with any member of the dialogue *can, in principle,*<sup>5</sup> have complete knowledge of the system including predicting how it will behave, in the same way as before. This situation is shown in Figure 6.2.

It follows from this that even for God as God-in-Dialogue with us there are things that are not possible. As MacKay put it:

---

2. This mirrors Popper’s finding that one cannot obtain complete information of any system of which one is a part.<sup>3</sup>

4. MacKay relates this to the practical situation of psychoses that can arise in human interaction where a party tries to gain complete knowledge of the scenario. MacKay, *Behind the Eye*, p 151. The solution is to rest satisfied with a less detailed representation of the other person.

5. But only as long as neither party is themselves trying to gain that information: in which case the system would be unstable and not provide any information to anyone. This is analogous to the scenario of a single agent trying to use the cerebroscope on themselves. Note also, that in this case the objective observer would *inter alia* have complete information about each individual in the dialogue (in the stable version of the scenario).

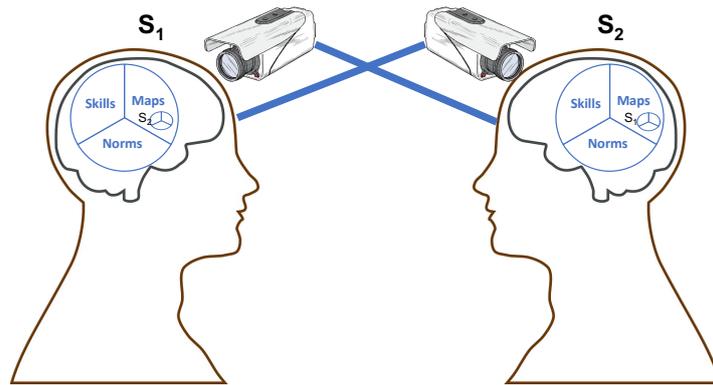


Figure 6.1: Agents in Dialogue

If, then, we take seriously the concept of dialogue with God, even God in dialogue with us meets us and knows us as determinators. He knows us as determinators of an immediate future which is indeterminate, notice, both for us *and* for Him in dialogue with us. For one who comes into dialogue with a cognitive agent – and dialogue means of course a reciprocal relation involving the cognitive mechanism of that agent – is in a situation in which there does not exist one and only one specification of the total situation with an unconditional claim to the assent of either of them.<sup>6</sup>

Of course MacKay's rationale for saying these things is the same as it was for the single agent case: and as such it is subject to the same criticism. But by the same token the modal modifications described in chapter 5 can be applied directly here with the same benefit.

---

6. MacKay, *Behind the Eye*, p 211.

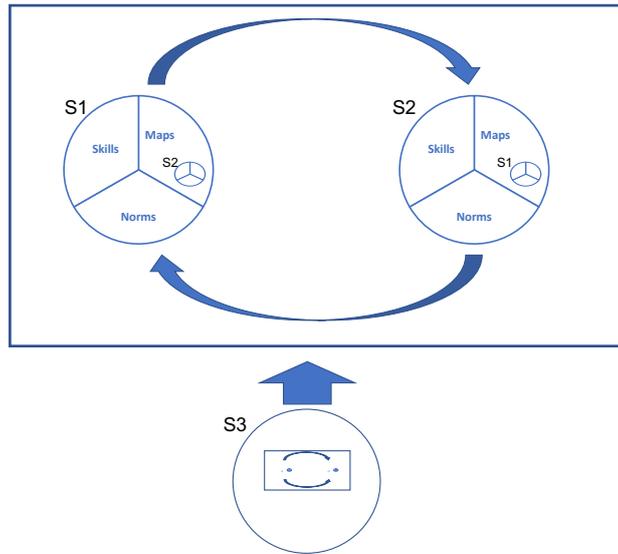


Figure 6.2: The Outside Observer

## 6.2 Prophecy

One of the practical criticisms of MacKay's theory of LI relates to how prophecy, particularly prophecy pertaining to events near at hand, fits with it.<sup>7</sup> One such instance is Jesus' prediction that Peter would deny him several hours hence. MacKay did not provide any detailed response to this situation.<sup>8</sup> However, I think the modal approach of this thesis can be used to elucidate the issue and provide an explanation of how LI is in fact compatible with at least this particular event. There is a quote in *The Clockwork Image* that is relevant here:

A description of brain state which is vague enough, or sufficiently far in the future, or sufficiently unrelated to the parts of your brain that would be affected by believing it, may have as good (or almost as good) a claim to your

7. MacKay, *The Clockwork Image*, p 110.

8. In fact when I presented the issue to him after one of his Gifford lectures his only response was that he considered it to be similar to the effect that a parent might have on a child in telling them, in encouragement, that they will win a particular race.

assent as to that of a detached observer.<sup>9</sup>

The key phrase here is “sufficiently far in the future.” If it is true that “the past is a foreign country”,<sup>10</sup> then the future is more so. We have already identified that in modal logic a world is a particular state of affairs. In this context we can view the situation in which Jesus foretells what will happen, and the one in which Peter actually denies him as being two different worlds for this purpose. Call the world of the prediction  $w_p$  and the world of the denial  $w_d$ .

The context, and importance, of this scenario is that if anything has a claim to the unconditional assent of everyone it is an utterance by the Word of God Incarnate (God-in-Dialogue). Jesus makes, or appears to make, a categorical statement about what Peter will do in the future, and so Peter ought to have believed it. Note however, that the prediction does not refer to Peter’s immediate future (under “laboratory” conditions) as specified for LI. It can be argued that the event referred to is sufficiently far in the future under significantly different conditions, and therefore warrants belief, as stated in the quote above. But we can unpack this further to make it more robust.

Recall that at a particular world, if  $(B \supset A)$  is true, then the fact that it is true at that world is true in every world. At  $w_d$ , say, we can assume that Peter’s  $CM(t)$  is in state  $B_d$ . That state is arrived at via all the influences currently affecting him (including having forgotten Jesus’ prediction<sup>11</sup>). Now, the action this state leads to is  $A_d$  (Peter’s denial). In this case  $w_d$  from the perspective of  $w_p$  is effectively an observation without interference and so the same logic applies here as in the analysis of Chapter 5. Granted that Jesus only communicated  $A_d$  to Peter at  $w_p$ ; but Jesus would have known  $B_d$  (or whatever the relevant antecedent would be). Hence it has a claim to his assent (and to Peter’s for that matter). On the other hand, at  $w_d$ ,  $B_d$  does not exist for Peter, as before,

---

9. MacKay, *The Clockwork Image*, p 80.

10. Hartley, *The Go Between*.

11. That Peter had forgotten the prediction follows from the fact that he is said to have “remembered” it in Lk 22:61.

and so the future is open to him in the same sense as previously (that is, he is free in the sense defined by MacKay in developing LI and in the modal version presented here).

The only person of whom I am aware that dealt with the issue of prophecy in relation to LI is Christopher Tinker.<sup>12</sup> He identifies two situations. The first is about events that are far in the future and in which the people referred to are unaware that the prophecy is about them: e.g. those crucifying Christ. This is not relevant to LI so I will say no more about it. The second is prophecy that is made directly to and about a particular person. Again he identifies two cases: the prophecy that Hezekiah will soon die (2 Ki 20) and Jesus' prediction that Peter will deny him (Matt, Mark, Luke, & John). It is not clear how the first of these is relevant to MacKay's LI. It is a prophecy regarding something that is going to happen *to* Hezekiah rather than about some action he will take, it is also delivered indirectly via a prophet (Isaiah) rather than spoken directly to Hezekiah, so does not strictly qualify as "God-in-Dialogue." As such it is about circumstances in which God appears to change his mind based on the response the prophecy receives. In this case, as noted by others (including Tinker in passing),<sup>13</sup> for this event Jeremiah 18: 7–8 may be relevant.<sup>14</sup>

The second example on the other hand is highly relevant and we shall look at it in more detail below. Tinker's solution to the problem is based on two things. The first is a misunderstanding of LI. He states, not simply that communication of the prediction to *S* results in making the future open, as MacKay puts it that it 'has a claim to *S*'s disbelief', but rather that it makes the prediction false (and hence has a claim to disbelief). This is a misunderstanding because if that is what LI amounted to it would not make the future

---

12. C. G. Tinker, 'God's foreknowledge and prophecy: A case study in Logical Indeterminism and Compatibilism – Part 1', *Churchman* 118, no. 1 (2004): 9–25; C. G. Tinker, 'God's foreknowledge and prophecy: An application – Part 2', *Churchman* 118, no. 2 (2004): 139–150.

13. Paul Helm, 'God in dialogue', chap. 11 in *Interpreting the Bible: historical and theological studies*, ed. A. N. S. Lane (IVP, 1997), 223–240.

14. These verses in Jeremiah are, strictly speaking, addressed to nations, but it does not seem like a stretch to consider that they would apply to an individual as well; especially a king who is representative of the nation.

open and indeterminate but still determinate: the prediction would be known to be false, thereby removing one of the agent's options. The second part is that Peter actually does disbelieve the prediction and this is what leads to his fulfilling the prophecy. It is based on, or follows on from, the fact that any communicated prediction about our *immediate* future has a claim to our disbelief. However, in this case, that pivots on the distinction between "immediate" and "sufficiently far in the future." Tinker takes it for granted that this situation refers to immediacy, when, as noted above, it is far from obvious that it does. Related to this then is, again as noted above, the fact that Jesus' utterances being God's word ought to be believed, hence it is not possible that Jesus would say something that would create a logical contradiction in the vicinity. This also suggests that Peter's denial is sufficiently far in the future and contextually different from the context of Jesus' utterance that it would not count for LI.

### 6.3 The Ontological Trinity

One major observation that MacKay makes regarding the implications of LI for the nature of God is that:

... by taking seriously the concept of dialogue with God, you have made untenable any Single Person model of the Deity. This, I think is non-trivial. Speak of the Deity as the Author of our space-time - and you can use personal categories of course, as the Bible does and as classical theistic theology does - and you are speaking of the Person of the Creator. But speak of God as One who can enter into dialogue with his created agents, and you are speaking of One for whom the knowledge He will have of those with whom he enters into dialogue is not the knowledge of the Creator without the space-time He has created. Or to put it the other way round, the One in dialogue with agents in space-time logically cannot have the knowledge which the Author outside

space-time (for whom space-time is one fact) can have.<sup>15</sup>

That is, God-as-Author, who knows all things about His creation, cannot be the same person who is in dialogue with it, since to be in dialogue is to be ignorant of some aspect of the creation, for the reasons given in Section 6.1. God-in-Dialogue is manifested most clearly in the Incarnation, in the person of Jesus Christ.<sup>16</sup>

MacKay provides an argument as to why God must be multi-personal, based on what it would be possible for God-in-Dialogue to know (as incarnate). This deals only with what is often referred to as the Economic Trinity. While this is a useful contribution in that it identifies why the creation is as it is, it does not say anything about the Ontological Trinity. (That is, why the Godhead is as it is independently of their relation to creation.) To explore that we need to have some idea, or definition, of what it is to be a person.<sup>17</sup> A thorough discussion of that would take us too far off track relative to the aims of this work so we shall take a pragmatic approach. Floridi identifies (human) persons as “Informational Organisms” (Inforgs),<sup>18</sup> with information here being “propositions.”<sup>19</sup> from a theological perspective Gordon Clark defines a person as a “complex of propositions”<sup>20</sup> Now whether or not a person is more than that, they are at least that and for our purposes this definition will suffice.

With this definition in hand we can revisit what MacKay said about knowledge of

---

15. MacKay, *Behind the Eye*, p 211. Some care is needed here: “the Person of the Creator” must refer to the person MacKay has referred to as “God-as-Author,” since in Classical ChristianTheism, while it is perfectly biblical to use personal terms to refer to God, he is not *a* person: he is tri-personal.

16. I leave aside the theological issue that it is Christ who “upholds all things by His powerful word” Heb 1:3 (ESV). All persons of the Trinity are involved in everything in creation, but particular things have one person more to the fore.

17. Here “person” is used for any agent with *reflective* knowledge, which, of course, any deity is bound to have.

18. Luciano Floridi, *The 4th Revolution* (Oxford: OUP, 2014), p 93.

19. Floridi, *The Philosophy of Information*, p 110. Floridi calls them “infons,” but there seems to be no difference in his writing between an infon and a proposition.

20. “[Man] is a congeries, a system, sometimes an agglomeration of miscellany, but at any rate a collection of thoughts.” Gordon H. Clark, *The Trinity* (Jefferson MD: The Trinity Foundation, 1985), p 106

the CM. In this case the CM is purely informational (i.e. there is no physical correlate). Here then, the specification of the CM is the complex of propositions that constitute it. As before, there is no such complex that any person would be correct to believe about themselves, for the simple reason that for them, that specification does not exist. And it seems incontrovertible that this is the case regardless of whether the person is human or divine. True, the knowledge of the persons of the Godhead is intuitive whereas ours is discursive, but that is about how we know not what we do or can know. MacKay's point is a logical one. So, if something does not logically exist for a person then that person cannot know it regardless of their mode of knowing. It is this aspect of LI that suggests, from an ontological point of view that God must be multi-personal. We have noted that this feature of LI is robust and implies that a single person cannot be "absolutely omniscient," they can only be "omniscient after their kind" (to borrow and bend terms from Spinoza<sup>21</sup>), since there is one thing that that person cannot know. Hence with respect to the Abrahamic religions, one either must give up on omniscience or singularity of personhood.

In Matthew 24: 36 (also recorded in Mk 13:32) Jesus says: "But concerning that day and hour no one knows, not even the angels of heaven, nor the Son, but the Father only." The traditional interpretation is that Jesus is ignorant here according to his humanity, but still omniscient according to His divinity. No doubt He is ignorant of many things as human, but the problem here is that the title "The Son" is a divine title!<sup>22</sup> We have no problem with God's omnipotence despite the fact that the Father was not, indeed could not be, incarnate, nor eternally generate, but we do seem to have a problem with God's omniscience if each of the persons of the Trinity does not know exactly the same things. As we shall see, this is not necessary, and, in fact, not even possible, but does not do any damage to the omniscience of the Godhead.

---

21. Benedict de Spinoza, *The Ethics, Part I, Definition VI*, ed. Tr. R. H. Elwes (Project Gutenberg, 2017). Here Spinoza refers to his definition of God as "absolutely infinite," which he distinguishes from the Christian definition of God, whom he considers to be only "infinite after his its kind."

22. As, of course, is the term "Father." They represent personal distinctions in the Trinity.

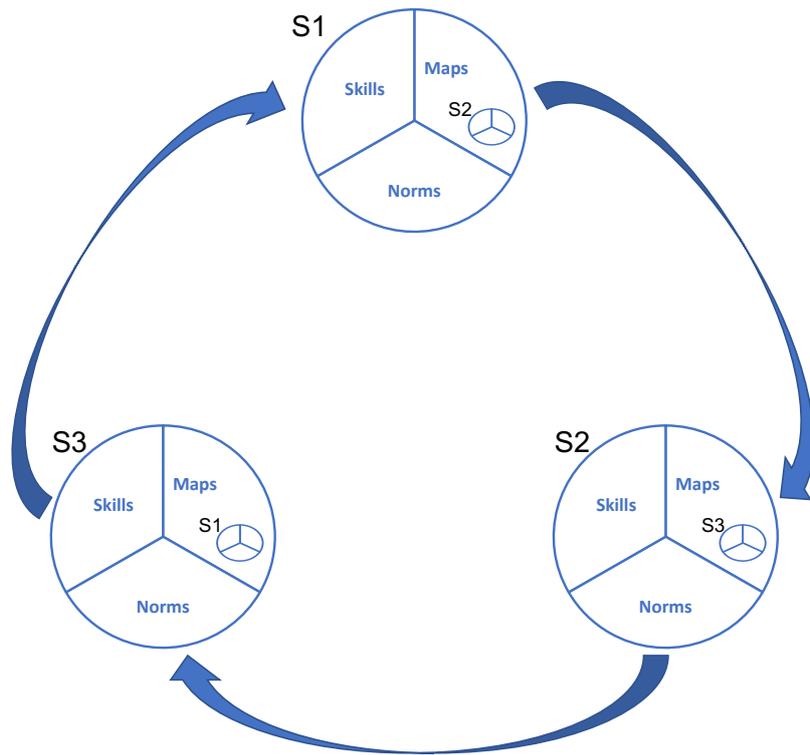


Figure 6.3: A Trinitarian Model

We can expand on this to provide an outline how it might work. As with the previous case while a single person cannot have complete knowledge of themselves, a second person can possess complete knowledge of them. Consider then two persons, A and B; each of whom is omniscient-after-their-kind. If they were independent (de-coupled), in say different scenarios, then between them they would have complete knowledge of the overall situation. That is, A would have complete knowledge of B and B (in the different scenario) would have complete knowledge of A. At this stage the situation is akin to “distributed knowledge.”<sup>23</sup> Now we have already seen that if these two are put together into a single system then neither of them can have complete knowledge of the system of which they are a part. What they would have in that case is: A would have complete knowledge of B, minus that part of B which contains their knowledge of A, and vice versa. Here the knowledge remains distributed and each person remains omniscient-after-their kind. This gives a clear individuation between the persons of the Trinity, since they share all knowledge in common (and have a single will) except for those propositions highlighted,

<sup>23</sup>. Fagin et al., *Reasoning about Knowledge*.

which are individual to each person. This is depicted schematically in Figure 6.3.

Once the persons of the Trinity have been individuated in this way, it is not possible to identify the Godhead as another person because being “tri-personal” is inconsistent with being *a* person! That is, the “Third Man” argument would be ineffective here<sup>24</sup> (as in fact it was ineffective in its original context).

At this point we need to ask how the persons are related. Unlike in the case of the super-scientist, these persons are divine and that gives us further aspects to explore. Firstly, if each person were a separate god, then one would have polytheism, but also a situation where no god was absolutely omniscient. In fact absolute omniscience would be rendered impossible. Second, it is not obvious how a “social” relation would overcome this problem. On the other hand if the persons were related as in classical Christian theism, whereby each person is individuated by what they know (and don’t know) and other than that they have the same knowledge and a single will, then the single multi-personal God will be absolutely omniscient, as one would expect. Up to this point there is no necessity for *Trinity*. All that has been said could apply in a binatarian (or even a quaternatarian) context. Ultimately, then, the exact number of persons in the Godhead is identified by means of Special Revelation. Nonetheless, in a manner similar to Richard of St Victor,<sup>25</sup> we can consider that to mirror logical or epistemological categories requires three persons. That is, logic (and mathematics etc.) have three fundamental relations: *reflexivity*, *symmetry*, and *transitivity*. In an epistemological context a single agent can only know reflexively, two agents can know symmetrically, but transitive knowledge requires three agents. While this does not rise to the level of a proof, it does point in the direction of *Trinity*.<sup>26</sup>

---

24. E. A. Taylor, *Plato: the man and his work*, 6th edition (London: Methuen & Co., 1949), p 355–356.

25. Dennis Bray, ‘Richard of St Victor’s argument from love and contemporary analytic theology of the Trinity’, *TheoLogica: An International Journal for Philosophy of Religion and Philosophical Theology* DOI: <https://doi.org/10.14428/thl.v6i2.63913> (2022).

26. MacKay, in presenting his original argument regarding God-in-Dialogue, was quite clear that he did not consider it a proof of the existence of God, simply that the God who is must be multi-personal. On the other hand one of the criticisms levelled at the Ontological Argument (OA) is that even if it were

Whilst MacKay saw the implications for the Trinity of LI, he did not explore it further, preferring to leave that to theologians. Unfortunately, as with the case of free will and determinism no theologian has taken this on. It is beyond the scope of this thesis to explore and develop these ideas in detail, but I have provided an outline of possible directions for future work.

---

valid, it would not be a proof of the the existence of the Christian God (as Trinity). However, the OA is based on ‘perfections’, and one such is omniscience. If any deity possessing omniscience must, on pain of contradiction, be multi-personal, then this could be used as part of the OA, which would bring it a step closer to demonstrating the existence of the Triune God.

# Chapter 7

## Conclusion

In this dissertation I have presented and analysed Donald MacKay's main contributions to theology and science: complementarity and logical indeterminism. Both these highlight the importance of standpoint (or perspective) for what one can say or predict. Each concept arose from reflection on scientific questions, and thus they serve as examples of the contribution of science to philosophy and theology. In reviewing these contributions critically, I have argued that while they are not perfect, they can be developed and improved to make them more robust, and I have put forward concrete solutions to achieve this.

In evaluating the quality of a thinker's *œuvre*, one can utilise a number of criteria, such as the nature of the contribution to the field, or the richness of the work as a foundation for further exploration. By both these measures MacKay's contribution is substantial, and that regardless of the fact that it has not, thus far, been extensively used nor developed in the domain of theology and science. It has been stated, and reiterated at several points in this dissertation, that MacKay was first and foremost a scientist. The fact that the ensuing arguments are so interesting and worthy of further exploration is itself an implicit contribution to the discussion regarding the relation between Theology and Science. Once stated, the philosophical and theological ideas stand on their own, independent of their

origin.

I have also suggested that MacKay was ahead of his time in the proposals he made and arguments he presented. While his rejection of the God-of-the-gaps approach is not unique, his proposal regarding how to handle it, which combined a high view of scripture, a strongly reformed theology, and a rigorous application of science was certainly innovative.

Complementarity, once the hierarchical version was distanced from its original similarity to supervenience, sits well with the recent interest in standpoint. It is particularly relevant to the informational method of Floridi,<sup>1</sup> though it could serve as a bridge to bring together his work with, at least some aspects of, the perspectivalism of Massimi.<sup>2</sup> There is certainly much more to be done in that area. An additional aspect to this is to see how these could be utilised in theology. Analytic theology<sup>3</sup> is a relative newcomer, but, as with analytic philosophy, it could well benefit from an informational perspective such as comprehensive realism may provide.

LI is definitely a proposal that should have been more influential than it actually has been. While for MacKay the main utility of the argument is as a solution to the determinism and free will question, I think that the issue of *logical reflection* is equally important and ripe for development, particularly as contribution to analytic theology as it wrestles with the question of the Trinity.<sup>4</sup> That said, there is some merit to looking further at how LI and List's Compatibilist-Libertarianism might be combined. (Though, LI, in its modal form would be the "senior partner" since it can operate where determinism holds at the agential level, a situation where List's approach, as he acknowledges, fails.) Together they have the potential to achieve what Crisp is looking for as a Calvinist-Libertarianism, albeit as a compatibilist solution.

---

1. Floridi, 'The method of levels of abstraction'.

2. Massimi, *Perspectival Realism*.

3. Oliver D. Crisp and Michael C. Rea, eds., *Analytic Theology* (Oxford: OUP, 2009).

4. See, for example, Oliver D. Crisp, *Analyzing Doctrine* (Waco, TX: Baylor University Press, 2019), ch. 4

Most of the philosophers whose names we associate with these “new” ideas, however, most likely have not heard of MacKay, possibly for the reasons suggested in Section 2.4. Two exceptions are Floridi, who does at least know the name, though he misattributes the definition of information to him (so his knowledge may be from secondary sources), and Helm, who knew MacKay personally and so should have at least engaged with MacKay in his own writings on freewill and determinism.

As a final comment: Donald MacKay was a pioneer in three separate (though related) scientific domains in the middle part of the 20th century. As such his life and work is a worthy subject for research in the history of science, in addition to the philosophical and theological concepts addressed in this research.

# Bibliography

- Alexander, Peter. 'Complementary descriptions'. *Mind* 65, no. 258 (1956): 145–165.
- Anderson, James N., and Paul Manata. 'Determined to come most freely: Some challenges for Libertarian Calvinism'. *Journal of Reformed Theology* 11 (2017): 272–297.
- Aquinas, Thomas. *Summa Theologica, Part one, Question 14, Article 8*. Library of Alexandria, 1845.
- Austin, W. H. *The Relevance of Natural Science to Theology*. London: MacMillan Press, 1976.
- Barbour, Ian. *Issues in Science and Religion*. Hoboken, NJ: Prentice Hall, 1966.
- Barclay, Oliver R. 'Donald MacKay and Semi-materialism'. *Perspectives on Science and Christian Faith* 43, no. 2 (1991): 141.
- . 'The Open Mind and other Essays: A Scientist in God's World'. Chap. Forward, edited by Melvin Tinker. IVP, 1988.
- Bedau, Hugo A. 'Complementarity and the relation between science and religion'. *Zygon* 9, no. 3 (1974): 202–224.
- Beebee, Helen. 'Compatibilism and the ability to do otherwise'. In *Reason and Responsibility: Readings in Some Basic Problems of Philosophy*, 16th, edited by J. Feinberg & R. Shafer-Landau. Cengage, 2016.
- . *Free Will: An Introduction*. Basingstoke: Palgrave MacMillan, 2013.
- Beilby, James K., and Paul R. Eddy, eds. *Divine Foreknowledge: Four Views*. London: IVP, 2001.

- Boyd, Gregory A. 'Divine Foreknowledge: Four Views'. Chap. *The Open Theism View*, edited by James K. Beilby and Paul R. Eddy. London: IVP, 2001.
- Bray, Dennis. 'Richard of St Victor's argument from love and contemporary analytic theology of the Trinity'. *TheoLogica: An International Journal for Philosophy of Religion and Philosophical Theology* DOI: <https://doi.org/10.14428/thl.v6i2.63913> (2022).
- Busemeyer, Jerome R., and Peter D. Bruza. *Quantum Models of Cognition and Decision*. Cambridge: CUP, 2012.
- Chalmers, David Bourget & David J. 'What do philosophers believe?' *Philosophical Studies* 170 (2014): 465–500.
- Clark, Gordon H. *Behaviorism and Christianity*. 1st ed. Jefferson, MD: Trinity Foundation, 1982.
- . *Predestination*. Phillipsburg, NJ: Presbyterian & Reformed, 1969.
- . *The Trinity*. Jefferson MD: The Trinity Foundation, 1985.
- Craig, William Lane. 'Divine Foreknowledge: Four Views'. Chap. *The Middle Knowledge View*, edited by James K. Beilby and Paul R. Eddy. London: IVP, 2001.
- Crisp, Oliver D. *Analyzing Doctrine*. Waco, TX: Baylor University Press, 2019.
- . *Deviant Calvinism*. Minneapolis, MN: Fortress Press, 2014.
- . 'John Girardeau: Libertarian Calvinist'. *Journal of Reformed Theology* 8 (2014): 284–300.
- . 'Libertarian Calvinism'. Chap. 7 in *Free Will and Classical Theism: The Significance of Freedom in Perfect Being Theology*, edited by Hugh J. McCann, 112–130. Oxford: OUP, 2016.
- Crisp, Oliver D., and Michael C. Rea, eds. *Analytic Theology*. Oxford: OUP, 2009.
- Cruz, Helen De. 'Religion and Science'. In *The Stanford Encyclopedia of Philosophy (Summer 2021 Edition)*, vol. <https://plato.stanford.edu/entries/religion-science/>. Stanford University, 2022.

- Darrow, C. 'Quoted in'. In *Determinism, Freewill and Moral Responsibility*, edited by G. Dworkin. Prentice-Hall, 1970.
- Davidson, Donald. 'Mental Events'. In *Experience and Theory*, 1st, edited by L. Foster and J. W. Swanson, 207–224. Clarendon Press, 1970.
- Dawkins, Richard. *The Selfish Gene*. Oxford: OUP, 1978.
- Dembski, William A. 'Conflating Matter and Mind'. *Perspectives on Science and Christian Faith* 43, no. 2 (1991): 107.
- . 'Converting Matter Into Mind: Alchemy and the Philosopher's Stone in Cognitive Science'. *Perspectives on Science and Christian Faith* 42, no. 4 (1990): 202–226.
- Dennett, Daniel C. *Elbow Room: The Varieties of Free Will Worth Wanting*. Cambridge Ma: MIT Press, 1984.
- . *Freedom Evolves*. London: Penguin, 2003.
- Draper, John. *History of the Conflict between Religion and Science*. Cambridge: CUP, 2010 (1874).
- Duce, Philip P. 'Complementarity in perspective'. *Science and Christian Belief* 8, no. 2 (1996): 145–155.
- Eddington, A. S. *The Nature of the Physical World*. 1st. Cambridge: CUP, 1929.
- Evans, C. Stephen. *Perserving the Person*. 1st ed. London: IVP, 1979.
- Evans, E F. 'Donald MacCrimmon MacKay, 1922 – 1987'. *Experimental Brain Research* 66 (1987): 225–227.
- Fagin, Ronald, Joseph Y. Halpern, Yoram Moses and Moshe Y. Vardi. *Reasoning about Knowledge*. Cambridge, MA: MIT Press, 1995.
- Feyerabend, P. K. 'Complementarity'. *Proceedings of the Aristotilian Society* Suppl. 32 (1958): 75–104.
- Fischer, J. M. 'Recent work on moral responsibility'. *Ethics* 110 (1999): 93–139.

- Fischer, J. M. 'Responsibility and alternative possibilities'. In *Moral Responsibility and Alternative Possibilities*, edited by D. Widerker and M. McKenna, 27–52. Ashgate, 2006.
- . 'The Frankfurt cases: the moral of the stories'. In *Deep Control: Essays on Free Will and Value*, edited by J. M. Fischer, 33–52. OUP, 2012.
- Fischer, John Martin, and Mark Ravizza. 'Precis of Responsibility and Control: A Theory of Moral Responsibility'. *Philosophy and Phenomenological Research* 61, no. 2 (2000): 441–445.
- . *Responsibility and Control: a Theory of Moral Responsibility*. Cambridge: CUP, 1998.
- Floridi, Luciano. *The 4th Revolution*. Oxford: OUP, 2014.
- . 'The method of levels of abstraction'. *Minds and Machines* 18 (2008): 303–329.
- . *The Philosophy of Information*. 1st ed. Oxford: OUP, 2011.
- Frankfurt, Harry G. 'Alternate possibilities and moral responsibility'. *The Philosophical Journal* 66, no. 23 (1969): 829–839.
- Garvey, John. 'The Real MacKay', 2016. <https://potiphar.jongarvey.co.uk/2016/07/24/the-real-mackay/>.
- Ginet, C. 'Can the will be caused'. *The Philosophical Review* 71 (1962): 49–55.
- Girle, Rod. *Modal Logics and Philosophy*. Second. Durham: Acumen, 2009.
- Good, I. J. 'Free will and the speed of computation'. *British Journal for the Philosophy of Science* 22 (1971): 48–49.
- Gosse, Philip Henry. *Omphalos: an Attempt to Untie the Geological Knot*. Paternoster Row, London: London: John van Hoorst, 1857.
- Haas, J W. 'Donald MacCrimmon MacKay (1922 – 1987): A view from the other side of the Atlantic'. *Perspectives on Science and Christian Faith* 44 (1992): 55–61.
- Habgood, John. *A Working Faith*. London: Darton, Longman / Todd, 1980.

- Harris, Mark. 'Private Communication'. 2021.
- Hartley, L. P. *The Go Between*. London: Hamish Hamilton, 1953.
- Hasker, William. 'MacKay on being a responsible mechanism: Freedom in a clockwork universe'. *Christian Scholar's Review* 8 (1978): 130–140.
- . 'Reply to Donald MacKay'. *Christian Scholar's Review* 8 (1978): 149–152.
- Hausam, Mark. 'Neo-omphalos'. 2013. Accessed. <http://freethoughtforchrist.blogspot.com/2013/06/creation-and-nature-of-time-or-neo.html>.
- Helm, Paul. 'Divine Foreknowledge: Four Views'. Chap. The Augustinian-Calvinist View, edited by James K. Beilby and Paul R. Eddy. London: IVP, 2001.
- . 'God in dialogue'. Chap. 11 in *Interpreting the Bible: historical and theological studies*, edited by A. N. S. Lane, 223–240. IVP, 1997.
- . *Reforming Free Will*. Fearn: CFP, 2020.
- . 'The contribution of Donald MacKay'. *Evangel* 7, no. 4 (1989): 11–12.
- Hilpinnen, R. *Deontic Logic: Introductory and Systematic Readings*. Dordrecht: Reidel, 1981.
- Honderich, Ted. *A Theory of Determinism: The Mind, Neuroscience and Life-Hopes*. Oxford: OUP, 1988.
- . *On Determinism and Freedom*. Edinburgh: Edinburgh University Press, 2005.
- Horgan, Terence. 'Supervenience'. In *The Cambridge Dictionary of Philosophy*, edited by Robert Audi, 778–779. Cambridge: CUP, 1995.
- Hudson, Hud. 'An essay on Eden'. *Faith and Philosophy* 27, no. 3 (2010): 273–286.
- . *The Fall and Hypertime*. 1st ed. Oxford: OUP, 2014.
- Hunt, David. 'Divine Foreknowledge: Four Views'. Chap. The Simple Foreknowledge View, edited by James K. Beilby and Paul R. Eddy. London: IVP, 2001.
- Hurley, S. 'Responsibility, reason, and irrelevant alternatives'. *Philosophy and Public Affairs* 28 (2000): 205–241.

- Inwagen, Peter van. 'The incompatibility of free will and determinism'. *Philosophical Studies* 27 (1975): 185–199.
- . 'When is the Will Free?' *Philosophical Perspectives* 3 (1989): 399–422.
- Ishtiyaque, Haji. 'A paradox concerning Frankfurt examples'. *Synthese* 196, no. 1 (2019): 87–103.
- Jeeves, Malcolm A. *Psychology and Christianity: the View Both Ways*. 1st ed. London: IVP, 1976.
- Kane, Robert. 'Free Will: new directions for an ancient problem'. In *Free Will*, edited by Robert Kane, 222–248. Oxford: OUP, 2003.
- . *The Significance of Free Will*. Oxford: OUP, 1996.
- Kemeny, J. G. *A Philosopher Looks at Science*. New York, NY: Litton Educational Publishing, 1959.
- Kneale, W. C., and M. Kneale. *The Development of Logic*. Oxford: OUP, 1962.
- Krauss, Lawrence M. *The Physics of Star Trek*. 1st. New York, NY: Perennial, 1996.
- Kripke, Saul. *Naming and Necessity*. Oxford: Blackwell, 1981.
- Lehrer, Keith. 'An empirical disproof of determinism'. Chap. 1 in *Metamind*, 19–42. OUP, 1990.
- Lemmon, E. J. 'Is there only one correct system of modal logic?' *Aristotelian Society Supplementary* 33 (1959): 23–40.
- Lewis, David. *Counterfactuals*. Oxford: Blackwell, 1973.
- List, Christian. 'Free will, determinism and the possibility of doing otherwise'. *Nous* 48, no. 1 (2014): 156–178.
- . 'What's wrong with the consequence argument: a compatibilist libertarian response'. *Proceedings of the Aristotelian Society* 119 (2019): 253–274.
- . *Why Free Will is Real*. Cambridge, MA: Harvard University Press, 2019.

- MacKay, Donald M. 'An analogy and its limitations'. *Christian Graduate* 6 (1953): 163–164.
- . *Behind the Eye*. Oxford: Blackwell, 1991.
- . 'Brain research and human responsibility'. In *Horizons in Science*, edited by Carl Henry. Harper. & Row, 1978.
- . *Brains, Machines and Persons*. 1st ed. London: Collins, 1980.
- . 'Choice in a mechanistic universe: a reply to some critics'. *British Journal for the Philosophy of Science* 22 (1971): 275–285.
- . 'Complementarity II'. *Proceedings of the Aristotelian Society* suppl. vol XXXII (1958): 105–122.
- . 'Complementarity in scientific and theological thinking'. *Zygon* 9, no. 3 (1974): 225–244.
- . 'Free will and causal predictions (Discussion)'. In *Cross Cultural Understanding: Epistemology in Anthropology*, edited by F. S. C. Northrup and H. Livingston, 356–364. New York: Harper. & Row, 1964.
- . *Freedom of Action in a Mechanistic Universe*. The Eddington Lecture. Cambridge: CUP, 1967.
- . *Human Science and Human Dignity*. 1st ed. London: Hodder & Stoughton, 1979.
- . *Information, Mechanism and Meaning*. Cambridge MA: MIT Press, 1969.
- . 'Logical indeterminacy and free will'. *Analysis* 21 (1961): 82–83.
- . 'Machines, brains, and persons'. *Zygon* 20, no. 4 (1985): 401–412.
- . 'On comparing the brain with machines'. *American Scientist* 42 (1954): 261–268.
- . 'On the logical indeterminacy of a free choice'. *Mind* 69 (1960): 31–40.
- . 'Ourselves and our brains: Duality without Dualism'. *Psychoneuroendocrinology* 7, no. 4 (1982): 285–294.

- MacKay, Donald M. ‘Perceptual stability of a stroboscopically lit visual field containing self-luminous objects.’ *Nature* 181 (1958): 507–508.
- . ‘Psychophysics of perceived intensity: a theoretical basis for Fechner’s and Steven’s laws.’ *Science* 139 (1963): 1213–1216.
- . ‘Responsible mechanism or responsible agent: a reply to William Hasker’. *Christian Scholar’s Review* 8 (1978): 141–148.
- . ‘Science and Christian Faith Today’. In *Real Science, Real Faith*, edited by R. J. Berry, 88–97. Monarch, 1991.
- . *Science and the Quest for Meaning*. Grand Rapids, MI: Eerdmans, 1982.
- . *Science, Chance, and Providence*. Oxford: OUP, 1977.
- . *The Clockwork Image*. London: IVP, 1974.
- . ‘The logical indeterminateness of human choices’. *British Journal for the Philosophy of Science* 24 (1973): 405–408.
- . *The Open Mind and other Essays: A Scientist in God’s World*. 1st ed. Edited by Melvin Tinker. London: IVP, 1988.
- . ‘The sovereignty of God in the natural world’. *Scottish Journal of Theology* 21 (1968): 13–26.
- . ‘What makes a contradiction?’ *Faith and Thought: The Journal of the Victoria Institute* 97 (1968): 7–14.
- MacKay, Donald M., and Michael E. Fisher. *Analogue Computing at Ultra-High Speed: An Experimental and Theoretical Study*. New York, NY: Wiley, 1962.
- MacKay, Donald M. MacKay & Valerie. ‘Explicit dialogue between left and right half-systems of split brains’. *Nature* 295 (1982): 690–691.
- MacKay, Valerie. ‘Donald M. MacKay: A Biography by his wife, written for their grandchildren’. Unpublished, 2021.

- Malebranche, Nicholas. *The Search after Truth*. Edited by tr. T. M. Lennon and P. J. Olscamp. Cambridge: CUP, 1997.
- Mascall, E. L. *Christian Theology and Natural Science*. Harlow: Longman, 1956.
- Massimi, Michela. *Perspectival Realism*. Oxford: OUP, 2023.
- . ‘The Routledge Handbook of Scientific Realism’. Chap. Perspectivism, edited by J. Saatsi. Routledge, 2018.
- McCorduck, Pamela. *Machines Who Think*. 2nd ed. London: Routledge, 2004.
- McDermott, J. ‘I’m free because I don’t yet know what I’m going to do’. *British Journal for the Philosophy of Science* 23 (1972): 343–346.
- McLaughlin, Brian, and Karen Bennett. ‘Supervenience’. In *The Stanford Encyclopedia of Philosophy (Summer 2021 Edition)*, edited by Edward N. Zalta, vol. URL = <<https://plato.stanford.edu/archives/sum2021/entries/supervenience/>>. Stanford University, 2018.
- Messer, Neil. *Science in Theology: Encounters between Science and the Christian Tradition*. London: T & T Clark, 2020.
- Miller, Hugh. *The Testimony of the Rocks; or, Geology in its Bearings on the Two Theologies: Natural and Revealed*. Boston MA: Gould / Lincoln, 1862.
- Monod, J. *Chance and Necessity*. London: Collins, 1972.
- Moreland, J. P. *Scaling the Secular City: A Defense of Christianity*. Ada, MI: Baker Academic, 1987.
- Murphy, Nancey. ‘Physicalism without reductionism: Towards a scientifically philosophically, and theologically sound portrait of human nature.’ *Zygon* 34, no. 4 (1999): 551–571.
- Nadler, Steven, ed. *The Cambridge Companion to Malebranche*. Cambridge: CUP, 2000.
- Norman, David. *Brain, Mind, and Soul in the Theological Psychology of Donald MacKay, 1922–1987*. 1st. Lampeter: The Edwin Mellin Press, Lampeter, 2007.

- Norman, David. ‘Mind, Body, and the Philosophical Theology of Donald M. MacKay’. PhD diss., University of Edinburgh, 2004.
- Plantinga, Alvin. *God, Freedom and Evil*. New York, NY: Harper, 1974.
- . ‘Law, cause and occasionalism’. Chap. 6 in *Reason and Faith: Themes from Richard Swinburne*, edited by Michael Bergmann & Jeffrey E. Brower, 126–144. OUP, 2015.
- . ‘On Ockham’s way out’. *Faith and Philosophy* 3, no. 3 (1986): 235–269.
- . ‘Supralapsarianism, or ’O Felix Culpa’. In *Christian Faith and the Problem of Evil*, edited by Peter van Inwagen, 1–25. Eerdmans, 2004.
- . *The Nature of Necessity*. Oxford: OUP, 1974.
- Polanyi, Michael. ‘Life’s irreducible structure’. *Science* 160 (1968): 1308–1312.
- Popper, Karl. ‘Indeterminism in quantum physics and in classical physics, I’. *British Journal for the Philosophy of Science* 1 (1950): 117–133.
- . ‘Indeterminism in quantum physics and in classical physics, II’. *British Journal for the Philosophy of Science* 1 (1950): 173–195.
- Preciado, Michael Patrick. *A Reformed View of Freedom*. Eugene, OR: Pickwick, 2019.
- Records., Guinness World. *Guinness World Records*. London: Guinness World Records Limited, 2023.
- Rios, Christopher M. *After the Monkey Trial: Evangelical Scientists and a New Creationism*. New York, NY: Fordham University Press, 2014.
- Sayers, Dorothy L. *The Mind of the Maker*. London: Methuen, 1941.
- Spinoza, Benedict de. *The Ethics, Part I, Definition VI*. Edited by Tr. R. H. Elwes. Project Gutenberg, 2017.
- T. Sarkar, A. Pavlou et al, K. Lieberth. ‘An organic artificial spiking neuron for in situ neuromorphic sensing and biointerfacing’. *Nat. Electron.* 5 (2022): 774–783.
- Taylor, E. A. *Plato: the man and his work*. 6th edition. London: Methuen & Co., 1949.

- Thalberg, I. 'New light on brain physiology and free will?' *British Journal for the Philosophy of Science* 21 (1971): 379–383.
- Thwaite, Ann. *Glimpses of the Wonderful: The Life of Philip Henry Gosse*. 1st. London: Faber & Faber, 2001.
- Tiessen, Terrence. *Providence and Prayer: How Does God Work in the World?* London: IVP, 2000.
- Tinker, C. G. 'God's foreknowledge and prophecy: A case study in Logical Indeterminism and Compatibilism – Part 1'. *Churchman* 118, no. 1 (2004): 9–25.
- . 'God's foreknowledge and prophecy: An application – Part 2'. *Churchman* 118, no. 2 (2004): 139–150.
- Torrance, Thomas F. *Theological Science*. Oxford: OUP, 1969.
- Vihvelin, K. *Causes, Laws, and Free Will: Why Determinism Doesn't Matter*. Oxford: OUP, 2013.
- Ware, Bruce. *God's Greater Glory: The Exalted God of Scripture and the Christian Faith*. Wheaton, IL: Crossway, 2004.
- Watkins, J. N. W. 'Freedom and predictability: an amendment to MacKay.' *British Journal for the Philosophy of Science* 22 (1971): 263–275.
- Whittle, Ann. 'Dispositional abilities'. *Philosophers' Imprints* 10, no. 12 (2010): 1–23.
- Williams, C. J. F. 'Comment on Professor MacKay's reply'. *Analysis* 22 (1961): 84–85.
- . 'Logical indeterminacy and free will'. *Analysis* 21 (1960): 12–13.
- Witt, L. W. de. 'The hidden assumption in MacKay's logical paradox concerning free will'. *British Journal for the Philosophy of Science* 24 (1973): 402–405.
- Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus*. 2nd edition. London: Routledge, 2001.
- Wyma, K. D. 'Moral responsibility and leeway for action'. *American Philosophical Quarterly* 34 (1997): 57–70.