APPLIED COGNITIVE PSYCHOLOGY

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A CASE STUDY APPROACH

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Preface

Cognition is a sub-discipline of psychology that examines principal elements of human existence. Explicitly, cognition studies the internal processes that underlie mental representation and interpretation of self and the external world (e.g. perception, memory, attention, problem-solving, language, and decision-making). Applied cognitive psychology is a dynamic and impactful branch of psychology that applies cognitive theory to real-world problems. This involves bridging the gap between conceptual knowledge and the practical challenges that people confront in everyday life. Through this textbook, the editors (Andrew Denovan, Kenneth G. Drinkwater, and Neil Dagnall; the 'Applied Cognitive Psychology Team') and their associates showcase the breadth and depth of applied cognitive psychology. This highlights the importance, practicality, and versatility of applied cognitive psychology. It also outlines how applied cognitive psychologists address challenges, enhance performance, and solve problems in domains such as education, healthcare, technology, business, and public policy.

The strength of this book lies in its dual focus. Firstly, it presents core topics in cognitive psychology and explains key concepts. Secondly, via case studies, the text showcases the relevance of topics in real-world contexts. This approach reflects the editors' and authors' commitment to making applied cognitive psychology an interesting and relevant subject to study. Each chapter serves as a standalone exploration of a key area, laying theoretical foundations, while concurrently making content accessible and salient through the use of rich case studies. These examples were informed by the actual work of psychologists, bring material to life, and are central to the learning process by engaging the reader, encouraging them to think critically, and highlighting the applicability of psychological theory and models. These elements stimulate scholarly engagement and consideration of career possibilities.

Andrew Denovan, Kenneth G. Drinkwater, and Neil Dagnall are renowned researchers in applied cognitive psychology. Their interdisciplinary research is innovative. Through exploration of diverse topics such as paranormal belief systems, the cognitive underpinnings of decision-making, and the mechanisms of memory, the Team have contributed significantly to academic research and teaching. This textbook is a natural extension of their work, a synthesis of rigorous investigation and applied insight designed to inspire students and practitioners.

A great strength of this textbook is its organisation. Each chapter, which is devoted to a core subject within cognitive psychology, provides a thorough and accessible introduction to key theories and concepts. The editors have ensured that contributors build a strong theoretical foundation, so the reader can comprehend complex psychological notions. In this context, these case studies personify the editors' approach to teaching and learning and bring theory vividly to life. Weaving together theory and practice, the textbook affords readers with a holistic understanding of cognitive psychology, which is intellectually satisfying and practically useful.

Applied cognitive psychology, like all sciences, embraces the spectrum of human experience. This textbook reflects that by incorporating case studies from a range of cultural, social, and economic contexts. Accordingly, this text equips readers to navigate these complexities.

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Consciousness

Do Zombies Think?

R. Stephen Walsh

Introduction

'Consciousness is a fascinating but elusive phenomenon; it is impossible to specify what it is, what it does, or why it evolved. Nothing worth reading has been written about it' (Sutherland, 1989, p. 95). Even now, more than 30 years later these words remain impactful and reflect the problematic nature of academic engagement with the concept of consciousness. Cobb (2020) reports that since Sutherland wrote those lines in 1989, more than 16,000 articles have been published that contain the word 'consciousness' in the title. 'Yet there is no agreement about how – and in some quarters even if – the brain produces consciousness' (Cobb, 2020, p. 336).

Similarly, Hoffman (2019) positions consciousness as one of the great mysteries of science, second only to the question of what it is that the universe is made of. Citing the nineteenth-century English biologist Thomas Huxley, Hoffman likens the emergence of consciousness from neural tissue to the emergence of the Djinn when Aladdin rubbed his lamp. To some, including myself, the mystery of consciousness constitutes both the hardest problem and the greatest mystery facing contemporary science.

So as you read this chapter, please be mindful that the content presented in it should be regarded as (very!) provisional, and contingent upon our current state of knowledge – which has of course moved on significantly since 1989 (e.g. Seth, 2018). In fairness, this provisional stance is probably the healthiest orientation to both psychology, and science more generally, in any case.

This chapter examines consciousness using the idea of zombies. For many years, philosophers have explored the notion of consciousness using the concept of zombies. Zombies, in the context of consciousness studies, do not denote the flesh-eating monsters typically depicted in modern fiction, but instead refer simply to the absence of consciousness. That is, the **philosophical zombies** discussed in this chapter will look and act like other people yet lack any internal or external awareness of existence. This classification is of interest to cognitive psychologists because it raises questions about physical explanations of consciousness.

The utility of philosophical zombies rests in their capacity to be used as a vehicle to facilitate a consideration of whether consciousness is a quality outside of, and distinct from, the physical realm. Moreover, if, after consideration of the philosophical zombie concept, one concludes that it is possible to function without consciousness, then this raises a vital question: what adaptive function does awareness itself serve? What is the point of consciousness? So, philosophically speaking, zombies represent an important dilemma because, if we accept their (however unlikely!) possibility, their existence implies that researchers will never identify the physical cause of consciousness. If, on the other hand, philosophical zombies are possible then cognitive materialism (the belief that mental processes and consciousness arise solely from physical brain activity) is futile. Some scholars disagree with this perspective and contend that philosophical zombies are logically incoherent and consequently impossible. Whereas other critics reason that zombies are a coherent but metaphysically possible concept. Drawing on the zombie metaphor this chapters explores current definitions and conceptualisation of consciousness.

Consciousness as a Psychological Construct

In the context of academic psychology, consciousness is perhaps best understood as a psychological construct, because consciousness is not something that we can see, or that we can touch, or that we can directly measure. It is generally accepted, and believed, that consciousness exists, but because there is nothing there for us to physically access, we construct definitions to try to capture the essence of the thing that we are trying to get at. There are a lot of leaps of faith required in considering, and talking about, consciousness. For example, the only way of determining whether another person is conscious is to ask them: If you think about it, the only way we can determine whether or not a person is conscious is either for them to tell us, or for us to ask them – first-person reports are the only way we can ascertain the presence of consciousness (Gamez, 2014). Next, you must believe the answer they give you! In theory, it seems possible (although of course it is not the case) that every single person you encounter could be either a sleepwalker or a zombie. More of which below.

Braisby and Gellatly (2012) describe consciousness as a frontier area of psychology and they set out some of the complexity attaching to the term. One of the things that makes the term 'consciousness' problematic is the range of different things that the word applies to: On the one hand 'consciousness' refers to states of consciousness – for example, 'normal' waking consciousness as opposed to an anaesthetised state. On the other hand, consciousness can refer to those things that we are conscious of – memories, music, our name being called, and so on – the contents of consciousness. And even thinking in terms of 'conscious of' is problematic. Here, in the 'consciousness of' realm, we have **phenomenal consciousness** (what it is like to taste coffee) and **access consciousness** (the cognitive contents of consciousness; being able to name or remember the thing that one is conscious of). In using the term 'consciousness', it may be that we are making the mistake of confusing magical naming for understanding. It could well also be that we are making a category error, or errors, in considering consciousness, whereby we are attributing things to one category when they should, in fact, belong to another category.

Access and Phenomenal Consciousness

In a delightful turn of phrase, Ned Block (1995) describes consciousness as a 'mongrel concept'. For Block, 'consciousness' is a hybrid tern that denotes a number of different phenomena. These phenomena include, phenomenal consciousness, access consciousness, self-consciousness, and monitoring consciousness.

Block (1995) proposed that, because of the limited capacity of what we can consciously report to ourselves, and to others, a useful framework for understanding consciousness is to distinguish between phenomenal and access consciousness. 'Phenomenal consciousness is experience; what makes a state phenomenally conscious is that there is something "it is like" (Nagel 1974) to be in that state' (Block, 1995, p. 228).

The mark of access-consciousness, in contrast with phenomenal consciousness, is the 'availability for use in reasoning and rationally guiding speech and action' (Block, 1995, p. 227). Our conscious reasoning, our conscious reporting, and the rational control of our actions is understood to be the function of access consciousness. This means that the rich subjective (phenomenal) experiences we have are not necessarily restricted to the very limited set of representations that we are accessing, and that we self-report. Block's (1995) concepts of phenomenal and access consciousness square neatly with how must of us understand and perceive what we might call our own conscious experience: for examples, as I type these words, it seems to me that I experience much more than what I can report to either myself, or that I can report to you, the reader.

Consciousness/Contents of Consciousness

Another way of conceptualising consciousness is to distinguish between consciousness and the contents of consciousness. Zhao et al. (2019) suggest that consciousness is comprised of two fundamental aspects: arousal/wakefulness being one aspect, and awareness, that is the contents of consciousness, being the other aspect. According to these authors more attention is given to arousal/wakefulness rather than awareness/contents of consciousness because disorders of awareness can lead to coma, and coma as well as the associated vegetative states are difficult to resolve.

States of consciousness, that is, for example, waking, dreaming, being intoxicated, being sedated, etc, are often researched with a neural focus on the thalamus and interactions between thalamus and cortex (e.g. Schiff, 2010). In contrast, research that is oriented towards the contents of consciousness is more often focused on cortical processing (Koch et al., 2016).

Aru et al. (2019) argue that a basic fact of consciousness is that consciousness can never be dissociated from the contents of consciousness (in other words, if you take all the contents out of consciousness, what is left is not conscious). As such, investigating states of consciousness without attending to the contents of consciousness, or vice versa, can, at best, only provide half a picture. According to Aru et al., cortical layer 5 pyramidal (L5p) neurons are fundamental to both the thalamo-cortical and cortico-cortical loops. In addition, the L5p neurons serve to couple the thalamo-cortical and cortico-cortical loops in a unique way. Consequently, there is a functional coupling of the state of consciousness and the contents of consciousness. As a result, Aru et al. conclude that investigating the relationship between L5p cells and consciousness offers one promising route for the development of understanding

links between individual consciousness and neurobiology. Of course attending to this relationship will not, in an immediate sense, address the hard problem of consciousness, a problem which will be considered in more detail below.

Defining 'Consciousness'

From the very outset, it must be clearly emphasised that there is no statement, or combination of words, currently in existence that can be presented as definitive when it comes to delineating the term consciousness (Zhao et al., 2019). There is, at this moment in time, no universally agreed definition of the term consciousness.

That said, one useful way of defining consciousness is evident in Goldberg's (2009, p. 35) take, which, according to himself, is a provocative one – 'the phenomenon of conscious experience is nothing more and nothing less than an activation of a sufficiently extensive neocortical framework for a sufficient length of time and at a sufficient level of intensity'. To this author's ears, the Goldberg (2009) definition would seem uncontroversial. Furthermore, it would seem to fit with what Pop-Jordanov and Pop-Jordanova (2009, p. 572) suggest is the prevalent neuroscientific concept at the present time, emergent materialism, 'according to which conscious experience is a coherent systematic property that emerges at some point of evolution when neural networks attain a certain degree of complexity'.

Another useful way to conceptualise consciousness is in terms of self-awareness. This way of understanding consciousness is ubiquitous (Williford, 2006). In essence, it is the idea that all consciousness incorporates some element of self-reference. In order for consciousness to be present, there must be an 'I' in the subjective, phenomenological mix. Damasio (2010) is a key author here. Damasio (2010, p. 157) links consciousness to self-processes. For him:

> Consciousness is a state of mind in which there is knowledge of one's own existence and of the existence of surroundings. Consciousness is a state of mind – if there is no mind, there is no consciousness; consciousness is a particular state of mind, enriched by a sense of the particular organism in which a mind is operating; and the state of mind includes knowledge that said existence is situated, that there are objects and events surrounding it. Consciousness is a state of mind with a self-process added to it.

Damasio (2010) argues that mind processes operate in a way that is non-conscious. What brings mind to consciousness is the inclusion of an 'I' in the process. Damasio (2010, p. 166) puts forward the view that

> if one is awake and there are content's in ones mind consciousness is the result of adding a self function to mind that orients the mental contents to one's needs and thus produces subjectivity. The self function is not some know-all homunculus but rather an emergence, within the virtual screening process we call mind, of yet another virtual element: an imagined protagonist of our mental events.

If Damasio is correct to think that without the inclusion of an 'I' in the process, mind is non-conscious, then it would seem to follow that, philosophically speaking, the concept of Zombie's requires some serious consideration.

What is a Philosophical Zombie?

Zombies: The ravenous hordes of undead who can terrify the sentient from the dank soil of gothic graveyards; or the deliciously flesh-curdling, tombstone lurching, putridness that we know from the fringes of our Haitian and New Orleans inspired imaginations. Those unaware monsters from beyond the grave who exist to consume the flesh of us who live. Zombies, an unconscious tidal wave set to decimate the living and subsume the world into unconsciousness. Zombies: Automatons who lack agency, control, or even the self-awareness to know that they are in fact dead. Those creatures of popular culture who straddle the apparently concrete boundary between the living and the dead are, unfortunately perhaps, not what we are talking about here. Almost what we are considering in this chapter. But not quite what we are considering.

It is important to be precise about our subject matter. Rather than cultural zombies, it is philosophical zombies who speak to the heart of this chapter on consciousness. Philosophical zombies are imaginary beings whose purpose is to shed light on problems of consciousness and how consciousness might relate to the material world. As Sue Blackmore (2007, p. 7) puts it, 'The philosopher's zombie is not some moulding half-corpse from Haiti that bumbles around in a trance; it is a thought experiment designed to help us think about consciousness'.

Philosophical zombies are imaginary beings who we think about in order to allow us to contemplate some of the problems that pertain to the concept of consciousness (Kirk, 2023). One important, and central, problem is how consciousness might relate to the physical/material world. Philosophical zombies offer us a thinking tool to grapple with the vexing problem of how an inanimate lump of meat, like our brains, might allow us to be conscious of the world. Phenomenology. Unlike the zombies in films or witchcraft, philosophical zombies mirror us non-zombie humans in all physical respects. Where the divergence lies is that philosophical zombies lack conscious experiences – there is no more phenomenology attaching to the zombie than there is to a tumble dryer. There is 'nothing it is like' to be a zombie in a way that there might be to, say, a bat (Nagle 1974). Notwithstanding the absence of lived experience, zombies behave just like us sentient beings, they can even engage in philosophical debate. In an uber ChatGPT sort of way.

It goes without saying that philosophical zombies do not exist. But that does not/should not detract from their usefulness as a conceptual tool. A thinking aid. Many philosophers hold that philosophical zombies are conceivable. Some philosophers even hold that they are possible. If it is the case that zombies are possible there are weighty consequences. If one accepts the possibility of zombies, then it follows that physicalism/materialism is false and that some kind of dualism is true. The possibility would suggest that mind and matter are indeed distinct 'things'. Distinct things of an order much as Descartes suggested (more of which below). For many who contemplate zombies in a philosophical sense, that reflection on mind/body dualism is the chief import of the zombie idea. But the zombie idea is also invaluable when it comes to wider philosophical theorising about consciousness, cognition, and other aspects of the human mind. Philosophical zombies force us to consider what exactly it is that the purpose of consciousness might be (Rose, 2006).

Qualia

An important term that is often used when philosophers of the mind consider what it is to be conscious is **qualia**. Qualia (singular 'quale') are those elements of our sensory awareness that might be called experience. Qualia have a subjective aspect to them that is central to the experience. There is something that it is like to see green, to smell coffee, to listen to Motörhead. A qualitative feeling. These feelings are qualia (Rose, 2006).

Qualia can be thought of as the contents of what a self experiences. Qualia can be thought of as the phenomenal consciousness of things, sights, the smell of the freshly dug earth, a soaring piece of music. The list is endless. To illustrate quale (pronounced kwah-lee; the singular of qualia) Ramachandran (2011) uses the example of a colour-blind Martian with an interest in what humans mean when they talk about colour. To address his curiosity, the Martian studies a human brain with technology sufficiently sophisticated to allow him map the exact neural, and neurochemical, correlates of a person's experience of the colour red. When the Martian examines his results, will he know what it is like to experience the colour red? Of course not. But the Martian and his colour study serves to neatly illustrate that gap which exists between the objectively observable correlates of red, and the experience of red. The contents of this gap between observable correlates and lived experience is what constitute qualia. Nobody can share their direct experience of red, or taste, or smell, or any other experience we have, with another. Indeed, it can be a shocking and arresting realisation that 'certainty about the world is like outside your mind will always be unavailable to you' (Lawrence, 2004)

And qualia are intimately linked with self. Ramachandran, 2011, p. 249 tells us that 'the notion of qualia, without a self experiencing/introspecting on them is an oxymoron'.

That is of course if qualia are a valid concept. Dennett (1993, p. 459) asserts that 'there are no such properties as qualia'!

We will leave it to the reader, if interested, to feed their own heads, draw their own conclusions, and perhaps explore just how deep the rabbit hole might be.

Intentionality

Related to qualia is the idea of **intentionality**. The idea of intentionality originates with Franz Brentano, the nineteenth-century philosopher. Intentionality is about 'aboutness'. When we are conscious, we are conscious of something, and there is something subjective that it is like to be conscious of something. For example, when I smell engine oil, I am immediately conscious of my childhood and working with my father. When my daughter becomes aware of the aroma of engine oil, she is conscious that her car might break down. Intentionality. Taken together, intentionality and qualia are defining characteristics of the human mind. Together, intentionality and qualia are the Big Problems of consciousness. The 'hard problem'. The problem of subjective experience (Blackmore, 2007).

Intentionality refers to 'aboutness', to meaning. Consciousness and mental states are always about something. In contrast to mental things, physical things, like stones, for example, are not about anything. Ice is not about anything, stones are not about anything. But your mental states are always about something. An action potential in your brain might be about the rain drumming off your window, or the traffic lights you are stopped at. But how

is that? How can the activity in certain parts of our physical brains be about something, in a way that a piece of granite cannot? This is the problem that is intentionality.

One view is that intentionality and qualia are not distinct 'things'. Instead, they can be understood as sharing a continuum whereby qualia are generated in the primary regions of sensory cortex and intentionality arises progressively towards the higher meaning centres as the 'depth of processing' increases (Rose, 2006, p. 366).

Dualism

Now, we have arrived at the hard problem. How does one go about reconciling the third-person perspective of scientific observer with the first-person lived experience of a conscious human being? The question at the fulcrum of the 'hard problem' is whether consciousness is of a different order than the physical world that surrounds each of us. René Descartes, the famous seventeenth-century French philosopher, certainly thought mind and matter are distinct orders of 'things'. He gave us Cartesian **dualism** – the idea that the human body can be located in physical space. But the mind cannot be. From Descartes's perspective, mind and body are so different that they can be thought of us two entirely different 'substances'. The philosopher Gilbert Ryle (1949) refers to Descartes's concept of mind as a 'ghost in the machine'; the machine being the separate body.

Descartes thought that he was the possessor of a body, and yet this body was not him. His body was a non-thinking thing that could be located in space. But he was a thinking thing who was not locatable in space Piekkola (2017). There is some sense to this if you think about it – when a person dies, we tend to dissociate them from their corpse and say, for example, 'such and such is no longer there'.

As an adjunct to thinking about the mind/body problem, it is interesting to consider where 'you' end and the world begins. Allport (1955) had a famous thought experiment where he asks people to imagine spitting into a cup until the cup is full. Then he asks them to imagine drinking the contents of the cup. Why is it disgusting? We drink cups full of saliva every day without noticing. There is something of the body that is/can be experienced as distinct from 'us'.

Descartes built his dualism off the back of three logical arguments:

- First, his method of doubt. One can doubt everything, except that one is a thinking thing.
- Second, our bodies are divisible in a way that our minds are not. They are distinct type of 'thing'.
- Third, mind and body have nothing in common.

On the last point, when one bumps one's head hard, it seems that the pain experienced contradicts the separation of mind and body. Descartes addressed this contradiction with the idea of 'interactionalism' – an understanding that although mind and body are separate, each influences the other.

In the religious sphere, dualism persists. Many religious believers think that our essence is a non-material soul. However, in the sphere of contemporary psychology, dualists are rare.

Monism

The opposite of dualism is **monism**, the proposition that mind and body are one. Mind and body being understood as essentially the same thing. Materialist is the name given to those scientists and philosophers who argue that consciousness is a property of the physical brain. Most materialists argue that conscious states and brain states are identical. Moreover, many materialists are also functionalists – they believe that mental states are defined by the ways in which they change some sort of input into some sort of output. Consciousness, to a functionalist, is not merely a by-product of brain processes; rather, consciousness is the direct driver of human behaviour.

Global Workspace Theory

Global Workspace Theory (GWT) was developed by Baars (1988, 1997). GWT is a cognitive theory of consciousness that builds on a theatre metaphor. Baars suggests that consciousness is akin to that which is on the stage, in a theatre, under a spotlight. In Baar's theatrical metaphor, all of the other 'things' that comprise the contents of the theatre – actors, audience, props – are present. These ancillary 'things' have a role to play in the production. But the ancillary things are not in the spotlight – they are not present in the conscious mind. The ancillary participants, in the theatre metaphor, are like those parts of the brain that get information from consciousness, but that are not visible under the spotlight. The director is behind the scenes, shaping the contents of consciousness, the script writer is telling the actor what to say. This metaphor of theatre and consciousness is a simple but useful one with a history, in Western thought, dating back to Plato (Blackmore, 2007).

In 2013, Baars et al. extended their Global Workspace Theory of conscious experience to incorporate brain evidence. In particular, Baars et al. (2013) wanted to concentrate on the role of the cortex, and the thalamus. Their argument is that, although appearing as distinct entities to the naked eye, the cortex and thalamus in fact function as an integrated system. The Baars et al. suggestion is that conscious experiences are the output of a flexible 'bind and broadcast' type of brain activity that is purposed to harness a wide and distributed number of cortical processes and networks. The dispersed cortical processes and networks are, in themselves, unconscious. The brain-based global workspace, according to the theory, meshes with an 'audience' of specialised knowledge sources situated in locations dispersed throughout the brain.

In essence, the Global Workspace Theory posits that a significant proportion of cognitive processing takes place outside the realm of conscious awareness. Furthermore, it is 'the winner' of a perpetual competition taking place between the broadcastings of unconscious, processing, modules that makes it into conscious awareness. As such, unconscious, and conscious modules are constantly interacting in a way such that the conscious, and unconscious, components are constantly transforming each other. According to the Global Workspace Theory, unconscious processing exists so that people can cope with everyday events in an automatic manner. Conscious processing (i.e. the global workspace) exists in order to facilitate the integration of information produced via unconscious processing in a way that makes the material available to consciousness (Song & Tang, 2008).

Global Workspace Theory (Baars 1988; Bars et al., 2013) suggests that conscious events are comprised of distinct properties:

- First is the global broadcasting that facilitates conscious awareness.
- Second is informativeness – the property that allows the brain habituate to novel signals such that there is neuronal updating that correlates with novel input.
- The third facilitator of conscious awareness is the internal consistency that characterises the contents of consciousness. In contrast, if the internal broadcasts are mutually exclusive, these broadcasts downgrade each other. Baars et al (2013) illustrate this point using the example of binocular vision.
- Fourth, all conscious events require the presence of an implicit self system.
- Fifth, and finally, Global Workspace theory proposes that conscious events are associated with a limited capacity and that conscious events have an operating cycle of 100–200ms.

Integrated Information Theory

Parsimony, also known as Occam's razor, is the idea that when contemplating competing explanations for a phenomenon, the simplest explanation is likely to be the correct one.

According to Koch (2012, p. 122) a significant omission of Baars's Global Workspace Theory, outlined in the previous section, is that it fails to consider what it is that might give rise to the phenomenology of consciousness. 'Why does the broadcasting of information with the bullhorn of long-range cortical fibres give rise to feelings? The models simply assert that this is what happens; they do not explain how.' This is a good point.

Integrated information theory, as presented by Koch (2012), approaches consciousness from an elegant, and parsimonious, start point: according to Koch, consciousness is a fundamental and elementary property of all living matter. Chalmers (2010, p. 17) shares this view, suggesting 'that a theory of consciousness should take experience as fundamental … alongside mass, charge, and space time'. Furthermore, Koch argues that we exist in a realm where all systems of interacting parts are in possession of some level of sentience. 'Intelligence can come in very different packages, whether it be a skull, an exoskeleton, or an aluminium box' (Koch, 2012, p. 120).

Information theory can be understood as sitting within the boundaries of a dualist ontology. The theory proceeds on the assumption that the phenomenal, qualia and feelings, are of a category separate and distinct from physical things, one's cerebral cortex and nerve fibres, for example. Information theory is rooted in an 'admission that experience, the interior perspective of a functioning brain, is something fundamentally different from the material thing causing it and that it can never be fully reduced to physical properties of the brain' (Koch, 2012, p. 119).

So, according to Koch (2012), consciousness comes with organised chunks of matter. In the case of human beings, and in common with the Global Workspace Theory, the cortex and the thalamus are key components of this organised matter. Information theory understands information as being the reduction of uncertainty. Moreover, information theory predicts that the more integrated the information is in a particular system, beyond the sum of its parts, the greater the quantity of consciousness experienced. The existence of the information systems

approach, in contemporary philosophising about consciousness, indicates that the dualist approach to understanding being, that originated with Descartes, and Cartesian dualism, may not yet have run its course.

However! The philosophising of Daniel Dennett in *Consciousness Explained* (Dennett, 1993) poses a weighty challenge to dualism. For Dennett, consciousness is pretty straightforward – it is simply what the brain does. Dennett (1993) is a determined and eloquent opponent of dualism. According to Dennett (1993, p. 33):

> The idea of mind as distinct in this way from brain, composed not of ordinary matter but of some other, special kind of stuff, is dualism, and it is deservedly in disrepute today … ever since Gilbert Ryle's classic attack (1949) on what he called Descartes's 'dogma of the ghost in the machine' dualists have been on the defensive. The prevailing wisdom, variously expressed and argued for is materialism: there is only one sort of stuff, namely matter – the physical stuff of physics, chemistry, and physiology – and the mind is nothing but a physical phenomenon. In short, the mind is the brain.

The Quantum Level

Another area of interest to some consciousness theorists is the quantum level. Towards the end of the twentieth century some theorists (e.g. Penrose, 1989, 1994) began to consider potential links between quantum-level phenomena and consciousness. Quantum physics suggests that the act of observation has an impact upon events – the proposal is that that a world-changing interaction takes place every time an event is observed. The stretch from this proposition to the idea that human consciousness, via observation, interacts with the material world at a quantum level (Rose, 2006) is a short one. Microtubules, proteins that run across the inside of nerve cells, are, it is theorised, a key component of a putative explanation as to what might be taking place if human consciousness can, in fact, be explained at a quantum level. Penrose's suggestion is that when a person experiences a conscious event, the experience of that conscious event is analogous with the quantum state of microtubules.

Cobb (2020) argues that linking quantum theories to not yet understood biological phenomena are especially attractive to mathematicians, like Penrose, because of the implicit assumption that if two things are mysterious, they must be linked. This may seem a little harsh. However, given our current state of knowledge, it appears that Cobb's (2020, p. 363) assertion that 'there is no evidence that quantum mechanics can explain consciousness' is impossible to contradict.

Ethical Aspects for Consideration Regarding the Psychology of Consciousness

In considering theory, research and clinical practice in the field of consciousness, it is important that we pause for a moment to consider the important and consequential ethical aspects of this area. Hopner and Liu (2021) argue for ethics as a first principle of

psychological research whereby relational aspects of the interactions between researcher and participant are core. Any study of consciousness, or clinical interactions in the broad sphere of consciousness, while fascinating and essential for understanding the human mind, raises several ethical concerns that must be carefully considered by those involved in the field of consciousness and it is important to briefly touch on these in the present chapter. These ethical implications span various domains, including research practices, technological advancements, and the treatment of individuals with disorders of consciousness.

Research Practice and Technological Advancements

One of the primary ethical concerns in consciousness studies is obtaining informed consent from participants. This is particularly challenging when dealing with individuals who have impaired consciousness, such as those in vegetative states or with severe cognitive impairments. It is also the case that advancements in neurotechnology, such as brain–computer interfaces (BCIs) and neural implants, offer promising avenues for enhancing or restoring consciousness. However, these technologies also pose significant ethical risks. There is potential for misuse, such as unauthorised mind control, surveillance, or cognitive enhancement without consent. Ethical guidelines must be established to govern the development and application of these technologies, ensuring they are used responsibly and for the benefit of individuals and society.

Impact on Identity and Personhood

Consciousness is closely tied to notions of identity and personhood. Interventions that alter consciousness, such as deep brain stimulation or pharmacological treatments, can have profound effects on an individual's sense of self. Ethical considerations must address the potential impact on personal and social identities, and on the individual's subjective experience. Researchers and clinicians must weigh the benefits of such interventions against the potential risks to the individual's sense of autonomy and selfhood.

Treatment of Disorders of Consciousness

The treatment and care of individuals with disorders of consciousness, such as those in comas or minimally conscious states, raise ethical questions about quality of life and end-of-life decisions (e.g. Lavrijsen, 2005). Determining the appropriate level of care and making decisions about life-sustaining treatments require careful ethical deliberation. It is essential to consider the wishes of the individual (if known), the perspectives of family members, and the potential for recovery or improvement in the individual's condition.

Another important facet of consciousness research to consider is the possibility of dual use implications. Research in consciousness studies can have dual-use implications, where findings intended for beneficial purposes could also be used for harmful applications (e.g. Butorac, 2021). For example, understanding the neural basis of consciousness could lead to advancements in mental health treatments but could also be exploited for military or coercive purposes. Ethical frameworks must be in place to anticipate and mitigate the risks associated with dual-use research.

The Interface Metaphor and 'Conscious Realism': Donald Hoffman

Moving back from the concreteness of ethics to more abstract and theoretical considerations, a recent, and very interesting, take on monism arises in the theorising of Hoffman (Hoffman & Prakesh, 2014; Hoffman, 2019). According to Hoffman (2019) the mystery of consciousness ultimately comes down to ontology – the mystery of consciousness is the mystery of who we are. In addressing this ontological question of 'who we are', Hoffman proposes that, ontologically, what we are is consciously experiencing creatures who hold beliefs. For Hoffman, the magic of 'us' lies in the gap between brain activity and conscious experience.

Hoffman's argument is that science has proceeded, for the last couple of hundred years, on the basis of what he calls a 'rookie error'. An erroneous assumption. Namely, the assumption that human perception is attuned to reality. Hoffman (2019) argues that this is the wrong way around. According to Hoffman, human perception is not attuned to 'reality'; rather, human perception is attuned to evolution and the purpose of perception is not to perceive 'the truth'. The purpose of perception is to ensure individual survival. According to Hoffman (2019, p. xiii), our senses hide the truth and display icons that allow us to survive. From this view, 'perception is not a window on objective reality. It is an interface that hides objective reality behind a veil of helpful icons … it is a mistake of logic to assume that if we must take our senses seriously then we are required – or even entitled – to take them literally'.

Hoffman notes (2019, p. 14),

> our utter failure to understand the relation between NCCs (neural correlates of consciousness; for example between fear and the amygdala) and consciousness. We have no scientific theories that explain how brain activity, or any other kind of physical activity – could cause, or be, or somehow give rise to, conscious experience. We don't have even one idea that's remotely plausible.

This is the hard problem of consciousness that we considered earlier in the chapter. It is called the 'hard problem' precisely because it is so intractable. We simply have no idea how the activity of some neural mechanisms translates into phenomenal experience. Furthermore, at this point of time, given the conceptual tools that we have to hand, one cannot imagine any biological fact that could bridge the gap and link the physical activity of brain matter with lived experience. What recording of, or observation of neural activity, or indeed what biological fact, could possibly account for the experience a person has when they witness the ferocity of an Atlantic storm or are comforted by the glow of a warm fire in the company of loved ones? At present, such a biological fact is inconceivable.

One way that this hard problem has been addressed, and which Hoffman (2019) responds to, is via identity theory, also known as 'central state materialism' (Place 1956; Smart, 1959). Identity theory proposes that each and every mental state is identical to a type of brain state. From this view, mental and physical categorisations map onto each other in a one-to-one manner. The experience of seeing a blue sky, and the brain state when seeing a blue sky are the same thing. There is just one level where the mind and the brain are the same thing. Cleeremans (2011) expresses this nicely: 'the conscious mind is the brain's (non-conceptual, implicit) theory about itself'.

Responding to identity theory, Hoffman (2019) argues that if the conscious experience of blue skies is identical to the specific brain state that gives rise to it, then it follows that there should be scientific laws, or principles, that state precisely what brain activity will lead to the conscious experience of blue skies. But such a law does not exist. And it seems unlikely that such a law will be identified in the foreseeable future. 'We have scientific laws that predict black holes, the dynamics of quarks, and the evolution of the universe. Yet we have no clue how to formulate laws, principles, or mechanisms that predict our quotidian experiences of tasting herbs and hearing street noise' (Hoffman, 2019, p. 15).

Unlike panpsychism, the idea that consciousness is everywhere to the point that consciousness is a property of physical objects, Hoffman (2008) proposes 'conscious realism'. A non-physical monism. According to Hoffman, consciousness is the fundamental 'stuff' of our universe. Physical matter is not fundamental. Consciousness is. Hoffman argues that what exists, in the objective world, independent of human perception, is a world of conscious agents. Rather than a world of unconscious particles and fields. According to Hoffman's view, consciousness comes is primary. Consciousness comes before everything, and physical things depend upon it for their existence. Hoffman is of the view that our common understanding has things backwards: instead, Hoffman proposes, rather than consciousness deriving from physical things, in Hoffman's view, physical things derive from consciousness. Of course, by Hoffman's own admission (Hoffman & Prakesh, 2014), conscious realism might be precisely wrong. However, what does make conscious realism unusual, in terms of thinking about consciousness, is that conscious realism offers precise hypotheses. Hypotheses that can be expressed mathematically. Crucially, these hypotheses can be tested in a scientific manner. It may be that Hoffman is correct, and, in time, concepts of object permanence might be replaced with objects of consciousness – but there is no doubt, but that conscious realism is truly an alternative model of consciousness (and reality). And a very interesting model at that.

What AI Might Tell Us about Consciousness

In recent years artificial intelligence (AI) has emerged as a powerful tool in the quest to understand consciousness and it would be remiss of me if it were not briefly considered here. While AI itself is not conscious, its development and capabilities offer valuable insights into the nature of consciousness and the processes that underlie it.

One important way in which AI might contribute to our understanding of consciousness is via the modelling of cognitive processes (van Rooij et al., 2024). AI systems, particularly those based on neural networks, can be designed to mimic the structure and function of the human brain. By creating models that replicate cognitive processes, researchers can study how these processes might give rise to consciousness. For example, deep learning algorithms can simulate aspects of perception, memory, and decision-making, providing a framework for understanding how these functions might be integrated in the brain to produce conscious experience.

AI can also analyse vast amounts of neurological data to identify patterns and correlations associated with conscious states (e.g. Yang et al., 2024). Machine learning algorithms can process brain imaging data to detect the neural correlates of consciousness (NCCs), which are the specific brain activities linked to conscious experience. This helps researchers pinpoint the

regions and networks in the brain that are crucial for consciousness, advancing our understanding of the neural basis of consciousness.

The development of AI also raises important ethical and philosophical questions about consciousness. For example, if AI systems become advanced enough to exhibit behaviours indistinguishable from conscious beings, how should we treat them? This challenges our understanding of consciousness and personhood, prompting deeper reflection on what it means to be conscious and the moral considerations that come with it. From my perspective, the conceptual challenges of imagining apparently sentient AI are fascinating. If you have not already seen *The Matrix* movie, written and directed by the Wachowskis, it might be a useful adjunct to the present chapter.

The Unconscious: Freud

In contrast to Hoffman's approach, introduced earlier, which has consciousness as fundamental to our being, an alternative model of the mind is that suggested by psychoanalytic perspectives, and also the later epiphenomenalists of cognitive science, who suggest that some, or most, of what we achieve with our minds, and our being, is the results of unconscious processes (Donald, 2001).

Appropriately enough, perhaps, we will begin our consideration of 'the unconscious' with the man who may be its best-known advocate, Sigmund Freud.

According to Freud, the human mind is a system that is made up of three mental subsystems: the unconscious; the pre-conscious, and the conscious. The unconscious contains picture like representations of 'things' that we cannot be aware of unless and until they move via the preconscious system into consciousness. According to Freud, for unconscious material to become conscious it must be transcribed into language. Furthermore, for this transcription to happen, unconscious thought must bypass two mental 'censors' who we might consider to be the gatekeepers of consciousness. Those representations that don't bypass the mental gatekeepers are 'repressed' (Smith, 1999).

Freud's model has a cognitive flavour to it in terms of the process approach it takes of the transition of 'things' from the unconscious to the conscious. But it is a somewhat 'soft' model in comparison to the minimalist approach taken by some in cognitive science who, according to the epiphenomenalist doctrine, assert that we are only occasionally conscious of what it is that we are doing (e.g. Donald, 2001, p. 25). Rather than applying the label 'unconscious' cognitive scientists will tend to use the words 'automatic processing systems', but the meaning is largely the same. Think, for example of a concert pianist as they perform. If the pianist concentrates too hard on, say, their finger movements, as they perform, errors will arise. Complex tasks, such as live musical performances, are best when performed as unconscious operations.

> Then what are we to conclude? … Are we nothing but clever automatons with absurd after the fact pretensions to awareness, freedom, and conscious dominion over what we do? Is the only resolution to this paradox to demote consciousness and dump it on the scrap heap? … (such a move) would suggest that we are, for the most part, preposterous illusory creatures who inhabit the cognitive underground

> along with the rest of creation while harbouring delusions of intellectual grandeur … The notion that we might be only a step removed from those imaginary zombies that populate horror films, staggering through life with merely the thinnest veneer of awareness is repulsive to most of us. (Donald, 2001, pp. 26–27).

However, an open stance to knowledge demands that we consider all possibilities. Even the possibility that we are more like zombies than we would choose.

Complex Tasks without Conscious Input: Zombie Agents

No consideration of consciousness would be complete without some attention to the split brain (more precisely: callosectomy) studies of Sperry and Gazzaniga. A callosectomy is an operation whereby the corpus callosum, a dense bundle of nerve fibres that link the cerebral hemispheres, is surgically severed, drastically limiting the inter-hemispherical neuronal links.

In their first study, Gazzaniga et al. (1962) considered the case of a 48-year-old man, WJ, a World War II veteran who had been suffering seizures for many years as a result of a brain injury sustained during wartime service. WJ had undergone a callosectomy in an effort to limit the damaging spread of epileptic seizures in his brain. Following the operation, it seemed that WJ was the possessor of two distinct minds, one associated with each cerebral hemisphere (for more, see Gazzaniga, 2014).

The Gazzaniga et al. studies have shown that each of WJ's cerebral hemispheres could perceive a visual stimulus independently, with only the left hemisphere (in WJ) being able to offer a verbal report (Gazzaniga et al., 1962).

In further, subsequent, studies researchers were able to show that it is possible to divide or 'split' the somatosensory system, the motor system, and other cognitive and perceptual systems in a manner similar to that observed in WJ. However, do bear in mind that the extent to which a single skull can be inhabited by independent conscious subjects is still hotly debated (Gazzaniga, 2014; Pinto et al., 2017; Sasai et al., 2016). The 'heat' of this debate is perhaps explicable because the very idea of split consciousness challenges one of our most deeply held assumptions: that consciousness is necessarily unified (Seth, 2018).

Vision for perception and vision for action: An insight into the purpose of consciousness?

Having considered the possibility that consciousness can be 'split' it is worth thinking about what consciousness is for, and, as with the split brain studies, a useful place to begin is with vision.

Case Study 10.1

DF

Just a few days after her 34th birthday in 1988, a young woman was taking a shower in her newly renovated cottage and was nearly asphyxiated by carbon monoxide from a poorly vented water heater. Although she had passed out from hypoxia, her partner found her before she died and rushed her to hospital. When she emerged from her

coma, it was clear that her brain had been badly damaged from lack of oxygen. Her vision was particularly affected. She could no longer recognise common objects by sight or even her husband and friends. In the days and weeks that followed her accident, she showed some improvement, but in the end she was left with a profound visual form agnosia; in other words, she could no longer identify objects on the basis of their shape. Indeed, in later testing, it became apparent that DF (as she is now known in the literature) could not identify even the simplest of geometric figures, although her ability to see colours and visual textures remained relatively intact.

DF's ability to perceive the form of objects is so compromised that she cannot distinguish a rectangular block of wood from a square one with the same surface area. Such blocks are often referred to as 'Efron' blocks, after the psychologist, Robert Efron, who first devised shapes such as these to test for visual form agnosia. DF cannot even manually estimate the widths of the blocks by opening her finger and thumb a matching amount. Nevertheless, one aspect of DF's visually guided behaviour with respect to object form has remained remarkably preserved. When she reaches out to pick up one of the Efron blocks, the aperture between her thumb and finger scales in flight to the object's width. Similarly, even though DF cannot distinguish perceptually amongst objects on the basis of their orientation and shape, she orients her wrist correctly when posting her hand or a wooden card through a slot and places her fingers on stable grasp points when picking up smooth-spline, pebble-like shapes. In other words, despite a profound deficit in form perception, DF seems able to use information about object form to guide her grasping movements.

(Whitwell et al., 2014, p. 1)

The case of DF is often understood in terms of **blindsight**. She can behave as if she can see, but she has no conscious awareness of her capacity to see. In a sense, she sees like a zombie might – there is no phenomenal component to her sight.

But what implications does this lack of conscious awareness, or blindsight, have in terms of thinking about consciousness? It is fair to say that the likelihood is that it is very hard to believe that DF's sensorimotor perceptual states, her blindsight, could be in any sense understood in terms of phenomenally conscious states. DF's perceptions are ones to which she as the subject of those states is blind, and, moreover, of which she cannot be aware. As such, the question, then, is what is the relevant difference between behaving as if one is aware and the phenomenal component of that awareness? What is it about a conscious perception that makes it phenomenal? What is it that a corresponding blindsight perceptual state is lacking? It would seem clear that the relevant difference must lie in the presence of something higher-order in the phenomenally aware state that missing in the blindsight state. By extension, it would seem to follow that the same would apply to the difference between unconscious and conscious desires, emotions, pains, and so on. A phenomenally conscious state will be a state of which the subject is aware – but this observation seems circular. It is my view that blindsight sheds little light on what it means to be conscious – except that sensorimotor perceptual states do not require it. Philosophical zombies might not be as far-fetched as one might initially imagine!

Case Study 10.2

Kenneth Parks – a Real-Life Zombie? Sleepwalking and Murder

Ken Parks was a married 23-year-old Canadian man with a wife and a five-month-old daughter when he fell asleep on his couch on the night of Saturday 23 May 1987. He had been watching *Saturday Night Live* on the TV when he nodded off. When he awoke, fully, it was the early hours of Sunday morning, 24 May 1987. Ken was driving his car with a bloody knife in his hands. Ken remembered seeing his mother-in-law's face looking at him. His mother-in-law was dead. An autopsy report showed that five stab wounds to the neck and chest, along with a `beating to the head resulting in a fractured skull and sub-arachnoid haemorrhage, were the cause of death. Ken's father-in-law had been choked to the point of unconsciousness in the attack. But he was alive. Ken was the attacker.

Ken Parks had been sleepwalking when he had carried out the attack on his in-laws: **somnambulism**. During his trial for the murder, and attempted murder, of his in-laws the evidence presented in court showed that Ken had no drugs or alcohol in his system at the time of the assaults. Ken had recently lost his job, he had gambling problems, a small child, a marriage that involved recent quarrels, and a history of sleep-related issues. Ken was a man under some considerable stress. He seldom remembered his dreams.

On the Saturday morning prior to the attack, Ken had played in a game of rugby. He was a big man and, during the game, he was on the receiving end of a mild blow to the right temple, which neither dazed him nor resulted in any loss of consciousness. Interestingly, Ken got along very well with his in-laws.

During the Parks murder trial, the legal defence offered, and upheld, was that Ken had committed homicide during an episode of non-insane automatism as part of a presumed episode of somnambulism. Automatism, from a medical-legal point of view, is a state during which behaviours are unconscious and involuntary – in the language of the present chapter, it is fair to describe this state as zombie-like.

Tying this to our consideration of consciousness in the present chapter: the Parks case shows that a person can dress, drive a car, and commit homicide without any conscious awareness. If these complex actions do not require consciousness, then what, one must ask, is the purpose of consciousness?

Pierson and Trout (2017) offer a useful, and plausible, answer to this question regarding the purpose of consciousness: they argue that the ultimate adaptive function of consciousness is to make volitional movement possible. According to Pierson and Trout, consciousness, via volitional action, makes it more likely that an organism will direct its attention, and its movements, to whatever is most important for its survival and reproduction. From this view, ultimately, we are conscious because it is more adaptive than not being conscious. And the concept of conscious being adaptive is useful because it takes us back, full circle, to Donald Hoffman and his idea that perception is attuned to evolution and the purpose of perception

is not to perceive 'the truth'. The purpose of perception is to ensure individual survival. According to Hoffman (2019, p. xiii), our senses hide the truth and display icons that allow us to survive. We are conscious because it is adaptive.

For more on the Parks case, see Broughton et al. (1994).

The 'Easy' Problem of Consciousness

Having outlined the 'hard problem' of consciousness (i.e. explaining phenomenal consciousness), it is necessary to briefly sketch the 'easy' problem of consciousness. In plain terms, this is simply about understanding the mechanisms that underpin conscious functions such as language and attention (Cohen & Dennett, 2011)

Consciousness is a difficult subject, and when approaching difficulties conceptual frameworks often help. In this instance, I propose a tripartite frame that might be applied to the term 'consciousness'. The three legs of the conceptual stool of consciousness, I suggest, here include: states of consciousness, self-consciousness, and intentionality – when we are conscious, there is always something that we are conscious of. Linking these three (conceptual!) legs, like the apron of a stool, are qualia – distinct, individual instances of subjective experience that always accompany our consciousness. The feeling of satisfaction that accompanies the first sip of coffee, or the sense of awe that accompanies standing on the edge of a tall cliff.

First, consciousness can be approached in terms of states of consciousness. Wakefulness or sleep for example. Or in terms of altered states of consciousness – the experience of deep meditation, religious ecstasy, or intoxication, amongst other states.

A second way to conceptualise consciousness is in terms of self-awareness. This conceptualisation is ubiquitous (Williford, 2006) and is essentially the idea that all consciousness incorporates some reflexivity, some element of self-reference. For something/someone to be conscious, there must be an 'I' in the subjective, phenomenological mix.

Thirdly, there is intentionality, the consciousness of things, sights, the smell of the underground, a soaring piece of music. The list is endless.

First, states of consciousness, a 'practical' approach to consciousness. The world of medicine is a pragmatic one, and a medical approach, as presented by O'Keane (2021), to consciousness is a useful place from which to proceed with our consideration.

Consciousness can be approached in terms of states of consciousness. Wakefulness or sleep for example. Or in terms of altered states of consciousness – the experience of deep meditation, religious ecstasy, or intoxication, amongst other states.

O'Keane (2021) refers to 'arousal consciousness', generally referred to by clinicians as 'arousal'. In plain language, this can be defined as wakefulness. Arousal and wakefulness are, in clinical terms, synonymous.

It is important to note that neither wakefulness, nor sleep, are single states. Consciousness is akin to the iceberg tip of mental processes. There is always metal activity happening that may not enter one's conscious awareness. When busy, for example, I often do not realise that I am hungry until I turn my computer off. That mental activity that is occurring outside of conscious awareness can be understood in terms of:

- non-conscious processes: for example, breathing and digesting.
- unconscious processes: this refers to the information that we process but are unaware that we process. In psychoanalytic thinking, this refers to those primitive urges and repressed memories that are never available to consciousness.
- and pre-conscious processes: this is the information that we process, but we are unaware that we are processing and is not in consciousness unless required. Pre-conscious information is that information that is readily available but not called upon unless required. For example, if running down a hill, we might avoid the slippery looking stones, without being aware of it, until we see the person beside us loosing their footing on one of these stones.

(Ayers and DeVisser, 2018)

Pop-Jordanov and Pop-Jordanova (2009) argue that research on consciousness should begin with arousal. Kahnemann (1973) defines arousal as that general mind activation which is the consequence of an individual's interacting with their environment. Zhao et al., (2019) present the state of arousal (i.e. wakefulness) as synonymous with the state of consciousness.

According to O'Keane (2021), with whom I agree, exploring consciousness is a tricky business because of the ease with which the narrative can slip into metaphysics and ethereal terms like 'transcendence'. What clinicians deal with is in the here and now. Utility is the watchword and, for practical purposes, to be useful, utilitarian concepts must offer the capacity to be measured.

In a 'normal' state of arousal, a person will be 'oriented by three'. That is, they will be able to respond verbally that they can identify time, place, and person. Importantly, arousal is a spectrum. At one end of the spectrum is under-arousal, perhaps caused by head injury or intoxication. In this state, a person may not orient to time, place, or person. Similarly, if over-aroused, perhaps because of stimulants, like cocaine, or perhaps because of a psychotic episode, orientation might not be possible.

One widely used way that medics measure arousal consciousness is with the Glasgow Coma Scale (GCS; Teasdale & Jennett, 1974). This measure includes three indices of wakefulness – eye opening, motor response, and verbal response – that are summed into a total score. A score of 8 or less is usually associated with severe head injury and a comatose state; 9–12 is generally considered moderate. The scale, while extraordinarily useful, and impactful, is also of value to us, in the present context, as it can shine a light on the limitations of our contemporary knowledge. Kolb & Whishaw (2015) report that up to half of those who are admitted to hospital with brain injuries score 13–15 on the GCS, indicating lack of coma. However, many of these patients go on to suffer the sequalae of head injury. Measures of brain injury severity, and by extension consciousness, are neither easy, nor straightforward. This may be because what it is that we are trying to measure is inadequately defined as a consequence of underdeveloped theorising and conceptual evolution.

As another, brief, aside, other measures of head injury severity include post-traumatic amnesia (PTA) and length of coma (LOC). A problem that arises with PTA is that there is inconsistency in the instruments used to measure it (Kolb & Whishaw, 2015). However, studies have consistently shown that the duration of post-traumatic amnesia is the strongest predictor of long-term cognitive and functional outcome, when compared to loss of consciousness (LOC) or Glasgow Coma Scale (GCS) scores (Chen & Batchelor, 2019).

Sleep and wakefulness are important areas of study that relate to consciousness, and it is interesting that there is significant brain activity, outside of conscious awareness, that happens during sleep. 'During REM [rapid eye movement] sleep the brain becomes activated: levels of neural firing, blood flow, and oxygen consumption increase to waking levels' (Ayers and deVisser, 2018, p. 182). If consciousness is simply a one-to-one relation to brain states, there is a compelling question to be answered as to why brain activity during REM states is not conscious in the same way as brain activity during wakeful states.

Sleep and wakefulness are massive subjects in their own right. However, before parking them for now, it is worth making brief mention of some of the neurotransmitters that have important influences on arousal. Acetylcholine is released from neurones in the pons and the basal forebrain; noradrenaline from the pons; serotonin from the reticular formation; and histamine and hypocretin from the hypothalmus. It is interesting that psychedelic drugs have often been linked to consciousness and that all of the neurotransmitters just mentioned are related to the functioning of psychedelics in the brain (Nichols, 2016; Yamada & Takumi, 1956)

Conclusion: Death

Considered by many to be final, death is perhaps an appropriate concept with which to conclude this chapter on consciousness. Interestingly, and soberingly, the 'specific correlations between cognitive manifestations and processes that define when life begins and ends are still undetermined' (Ben-Soussan & Paoletti, 2024, p. 1). Theorists have defined human death as 'the loss of consciousness'; that is, linked to destruction of the neocortex in an irreversible way. However, 'consciousness does not bear a simple one-to-one relationship with higher or lower brain structures' (Machado, 1999, p. 156).

This observation should certainly give us some pause for thought when reflecting on our current state of knowledge. Conceptually, we are lacking. In terms of life, death, and consciousness. This chapter has attempted to outline some of the major themes that run through contemporary consciousness studies. And it has raised questions: Is consciousness a coherent concept? Is consciousness a concept relating to one thing? Or many things? When we talk about consciousness, are we substituting magical naming for understanding? Is matter primary, and does consciousness derive from the physical? And, if so, how does that couple of pounds of meat contained in our craniums give rise to (literally!) a whole world of experience? Or is Donald Hoffman correct when he suggests that the relationship is actually the other way around, that consciousness is primary?

I expect that when future generations review our contemporary understandings and musings with regard to consciousness, our cutting-edge thought will look primitive, and perhaps even laughable. But that is a good thing, because it means that there are vast expanses of virgin territory to be investigated and understood in this hugely important realm of human understanding. In the meantime, there is much to muse on with regards to consciousness:

> They say to me in their awakening, 'You and the world you live in are but a grain of sand upon the infinite shore of an infinite sea.'
>
> And in my dream I say to them, 'I am the infinite sea, and all worlds are but grains of sand upon my shore.' (Kahlil Gibran, *Sand and Foam*)

The exploration of consciousness, as presented in this chapter, reveals the profound complexity and multifaceted nature of one of the most enigmatic aspects of human existence. The journey through various philosophical, psychological, and scientific perspectives underscores the challenges and the richness of studying consciousness.

Philosophical zombies and the nature of consciousness: The concept of philosophical zombies serves as a powerful thought experiment, challenging our understanding of consciousness. By contemplating beings that are physically identical to humans but lack conscious experience, we are forced to question the very essence of what it means to be conscious. This thought experiment highlights the limitations of physicalist explanations and opens the door to dualist perspectives, suggesting that consciousness might be an entity distinct from the physical brain.

Defining consciousness: The chapter underscored the difficulty in defining consciousness. Despite numerous attempts by scholars across disciplines, there is no universally accepted definition. This lack of consensus reflects the inherent complexity of consciousness and the diverse ways it can be understood. Whether viewed through the lens of self-awareness, phenomenal experience, or cognitive processes, each definition captures only a part of the whole.

Qualia and intentionality: The discussion on qualia and intentionality brought to light the subjective nature of conscious experience. Qualia, the individual instances of subjective experience, and intentionality, the 'aboutness' of mental states, are central to understanding consciousness. These concepts emphasise that consciousness is not just about processing information but also about the rich, subjective quality of experiences.

Dualism vs monism: The debate between dualism and monism remains a central theme in the study of consciousness. Dualism, with its roots in Cartesian philosophy, posits a fundamental distinction between mind and body. In contrast, monism, particularly materialism, argues that consciousness is a product of physical processes in the brain. This ongoing debate highlights the difficulty in reconciling the subjective nature of consciousness with objective scientific inquiry.

Theories of consciousness: The chapter explores several theories that attempt to explain consciousness, including Global Workspace Theory and Integrated Information Theory. These theories offer frameworks for understanding how consciousness might arise from neural processes. However, they also reveal the limitations of current scientific approaches, as they often fail to account for the subjective quality of conscious experience.

Ethical implications: The ethical considerations in consciousness studies are profound. Issues of consent, personhood, and the potential misuse of neurotechnology underscore the need for careful ethical deliberation. The treatment of individuals with disorders of consciousness raises questions about quality of life and the right to autonomy. As research advances, it is crucial to ensure that ethical guidelines keep pace with scientific developments.

Interdisciplinary approaches: The study of consciousness benefits from an interdisciplinary approach, integrating insights from psychology, neuroscience, philosophy, and artificial intelligence. This collaborative effort enriches our understanding and opens new avenues for research. However, it also highlights the need for a unified framework that can bridge the gaps between different disciplines.

Future directions: Looking ahead, the study of consciousness is poised for exciting developments. Advances in neuroimaging, artificial intelligence, and quantum theories offer new tools and perspectives. However, the 'hard problem' of consciousness – explaining how physical processes give rise to subjective experience – remains unresolved. Future research

must continue to grapple with this challenge, seeking to uncover the fundamental nature of consciousness.

In conclusion, the study of consciousness is a journey into the heart of what it means to be human. It challenges our understanding, pushes the boundaries of science and philosophy, and raises profound ethical questions. As we continue to explore this mysterious phenomenon, we must remain open to new ideas, respectful of diverse perspectives, and committed to ethical integrity. The quest to understand consciousness is not just a scientific endeavour but a deeply human one, reflecting our desire to know ourselves and our place in the universe.

Key Terms

Access consciousness: The aspect of consciousness that involves the availability of information for reasoning and guiding behaviour.

Blindsight: A condition in which a person can respond to visual stimuli without consciously perceiving them.

Dualism: The philosophical view that mind and body are fundamentally distinct kinds of substances or realities.

Intentionality: The quality of mental states that are directed at or about something, such as thoughts, beliefs, or desires.

Monism: The philosophical view that mind and body are not distinct and that consciousness arises from physical processes.

Phenomenal consciousness: The subjective experience of being aware, often described as 'what it is like' to experience something.

Philosophical zombies: Hypothetical beings that are physically identical to humans but lack conscious experience.

Qualia: The individual instances of subjective, conscious experience, such as the redness of red or the taste of coffee.

Somnambulism: Sleepwalking; performing complex behaviours while in a state of sleep without conscious awareness.

Further Reading

Gazzaniga, M. S. (2014). The split-brain: Rooting consciousness in biology. *Proceedings of the National Academy of Sciences*, 111(51), 18093–18094. doi: 10.1073/pnas.1417892111

This paper explores the implications of split-brain research for understanding consciousness, highlighting how severing the corpus callosum can reveal distinct mental processes within the same brain.

Broughton, R. J., Billings, R., Cartwright, R., Doucette, D., et al. (1994). Homicidal somnambulism: A case report. *Sleep: Journal of Sleep Research & Sleep Medicine*, 17(3), 253–264.

This case report examines a rare instance of homicidal somnambulism, providing insights into complex behaviours performed without conscious awareness

Hoffman, D. D. (2019). *The case against reality: How evolution hid the truth from our eyes*. W.W. Norton & Company.

Hoffman's book argues that human perception is not attuned to objective reality but to survival, offering a provocative perspective on the nature of consciousness and challenging traditional views on how we perceive the world

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