

# Naturalism, Realism, and the Neuroscience of Death Experience

Work in Progress

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## **Abstract**

Medical neuroscience researchers conducted a multicenter observational study with structured interviews of cardiac arrest patients revived by CPR. The study says the following: the patients exhibited no clinically detectable consciousness during cardiac arrest, while previous research indicates that brain activity completely ceases with 20-30 seconds of cardiac arrest; 39% of the interviewed patients reported detailed memories from their cardiac arrest; 6% of the interviewed patients reported detailed memories that also cohere with a near-death experience defined by Greyson. The researchers propose that the memories are not illusory, while other neuroscientists propose that the types of memories are illusory and the respective experiences occurred before or after the temporary cessation of brain activity. I examine the study in the context of liberal naturalism and metaphysical realism.

## **1. Introduction**

Cardiac arrest indicated death until the advent of cardiopulmonary resuscitation (CPR).<sup>1</sup> Consider the first four traditional stages of death, that is, pallor mortis, algor mortis, rigor mortis, and livor mortis. Paramedics use CPR on patients with signs of pallor mortis or algor mortis, and

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<sup>1</sup> The medical term *cardiac arrest* means "the cessation of a body's heartbeat and respiration."

some of the dead patients revive—the process of death reverses. Alternatively, patients with signs of rigor mortis or livor mortis are declared irreversibly dead and CPR is not administered. Yet, if the patient has a Do Not Resuscitate order and is otherwise resuscitable, then a patient with signs of pallor mortis or algor mortis is immediately declared dead. Similarly, apart from extenuating circumstances such as the use of anesthesia during surgery, a patient with signs of cardiac arrest and a Do Not Resuscitate order is declared dead (Parnia 2014).

A prospective medical neuroscience study called *AWARE* had observed cardiac arrest patients revived by CPR in 15 clinical centers (Parnia et al. 2014). *AWARE* used interviews and medical records for the systematic study of cardiac arrest patients who reported conscious awareness and other mental experiences during periods of time with no clinically detectable consciousness,<sup>2</sup> while previous research indicates that brain activity completely ceases with 20-30 seconds of cardiac arrest. The study says that 39% (55/140) of the patients reported detailed memories from their time of unconsciousness; 61% (85/140) reported no memories from their time of unconsciousness; 6% (9/140) reported detailed memories from their time of unconsciousness that cohere with a near-death experience (NDE) defined by Greyson (1983).

My paper analyses *AWARE* and the criticism of NDEs by Mobbs and Watt (2011) and Mobbs (2012) in the context of liberal naturalism and metaphysical realism, such as Putnam's (2015) naturalism and realism.

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<sup>2</sup> I define that the term *mental experience* is synonymous with *cognitive experience*.

## 2. Liberal Naturalism

Putnam's (2015) liberal naturalism includes truth, reason, and ethical norms which are outside of Field's (1972) physicalism. For example, Putnam implies that truth, reason, and ethical norms are completely natural while they do not reduce to natural science.

My liberal naturalism focuses on *unobservable entities*. Examples of unobservable entities are truth values, mental reasoning, and ethical norms. I define two classes of unobservable entities: (1) abstract entities and (2) phenomenal entities. For instance, truth values are abstract entities. Furthermore, mental reasoning and ethical norms are phenomenal entities. This section continues to describe phenomena and liberal naturalism while the next section describes truth values.

I define that a *phenomenal unobservable entity* is a phenomenon that is incompletely detectable by current technology and has measurable effects. For example, research psychologists apply the scientific method to subfields such as human cognitive processes (Cooper et al. 2012). This includes the study of mental reasoning and memories. Also, social scientists apply the scientific method to the research of social phenomena such as ethical norms and group behavior (Ragin and Amoroso 2018). Likewise, some aspects of cognitive processes and ethical norms can be researched with the scientific method.

This paper focuses on the neuroscience of death experience, but I will first illustrate an unobservable entity and liberal naturalism with an example from physics. Unanimous scientific consensus says that gravity is a fundamental interaction of physics, but no unanimous consensus defines if the structure of gravity is a force or a forceless interaction. For example, Einstein (1961) developed his theory of gravity called *general relativity* while meticulously documenting the orbit of the planet Mercury. His theory states that gravity has no quantum fields and is caused

by the forceless interaction between mass and relative spacetime. However, a current majority of gravitational physicists hypothesise the existence of unobservable gravitational force fields and the respective quantum particle called the *graviton* (Dyson 2012). For instance, the majority say that Einstein's theory of forceless gravity has no nomological possibility of interacting with quantum systems such as photons and subatomic particles. They also say that a gravitational force field with zero mass coheres with quantum mechanics and Einstein's field equations for general relativity. However, no current or future technology could directly observe any gravitational force field because of the implied minuscule scale and extra dimensions. In other words, assuming the majority that says gravity is a force, then the observable effects of gravity are ubiquitous while no current or future technology can possibly detect the structure of gravity.

Regardless if gravity is a forceless interaction or a force, then gravity is a fundamental entity of physics and an unobservable entity. Likewise, unobservable entities are fundamental to natural science which indicates the importance of liberal naturalism.

### **3. Metaphysical Realism**

Putnam (2015) says that his liberal naturalism coheres with metaphysical realism while some liberal naturalists are metaphysical antirealists. He summarizes his metaphysical realism:

The form of metaphysical realism that the author endorses rejects every form of verificationism, including the author's onetime 'internal realism', and insists that our claims about the world are true or false and not just epistemically successful or unsuccessful and that the terms they contain typically refer to real entities. (Putnam 2015, 312)

I agree with Putnam's focuses on the principle of bivalence and the reality of most referents. For example, my clarified principle of bivalence follows in Proposition 1:

- (1) Any precise propositional statement has one truth value that is completely true (T) or not completely true ( $\perp$ ).

One could technically strain metaphysical realism into cohering with global skepticism. For example, one could say that any precise proposition has one truth value that is completely true or not completely true, but also say that fallible human perception cannot learn any accurate knowledge generated by personal experience and fallible scientific observation. I appreciate the imperfections in the scientific method and the neurological processes of human perception, while I nonetheless hold that the scientific method which includes rigorous skepticism has indicated many cases of scientific fact. For instance, I agree with the basics of the *no miracles argument* for scientific realism, which was recently defended in detail by Dawid and Hartmann (2018).

My minimalist position of the no miracles argument for scientific realism introduced here says that a scientific theory with global scientific consensus is typically wholly or mostly truthful. The argument requires that the scientific theory is based on reproducible observations and rigorous skepticism. The reproducible observations and rigorous skepticism indicate truth about the natural world. For example, *basic* scientific theories taught in contemporary science textbooks in all of the inhabited continents are typically accurate. The entities defined by the basic scientific theories typically refer to real entities. For instance, the basics of chemistry taught in current chemistry textbooks accurately refer to real characteristics of real chemical elements and compounds.

That said, some new scientific hypotheses are eventually rejected by scientific consensus; some are indefinitely in limbo; and some are eventually accepted by scientific consensus.

Regardless of the outcome, every scientific hypothesis can be stated as a proposition while the principle of bivalence implies that the hypothesis is completely true or not completely true.

I also clarify that the no miracles argument is reasonable while metaphysical antirealists, global skeptics, and mereological nihilists continue to dissent against all basic scientific theories. Nonetheless, I hold that the no miracles argument is more reasonable than any dissenting philosophy.

One final note for this section, I previously mentioned that truth values are abstract entities. However, I clarify that the *cognition* of a truth value or any other abstract concept is a phenomenon.

#### **4. The Greyson NDE Scale**

The advent of CPR caused the surprise of dead people coming back to life. A bigger surprise from the widespread use of CPR is that a minority of cardiac arrest survivors reported memories from their time of temporary death (Greyson 1983; 1985; Mobbs and Watt 2011; Greyson, Holden and van Lommel 2012; Mobbs 2012; Parnia 2014; Parnia et al. 2014). Some of these experiences are called an *NDE*.

I clarify that the referent of an NDE related to cardiac arrest is more accurately called a *death experience* or a *near-irreversible-death experience*. Also, some NDEs involve a brush with death and fortunately no cardiac arrest, while these cases precisely fit the term *NDE*.

Furthermore, some NDEs involve an imagined brush with death when there was no real danger

of death. Likewise, an NDE can involve an imagined brush with death, a real brush with death, or cardiac arrest.

The surge of reported NDEs since the advent of CPR prompted Greyson (1983; 1985) to introduce the NDE scale. The scale uses a patient survey with 16 questions and three weighted alternative answers for each question that have point values of 0, 1, and 2, respectively. A patient survey with points totaling greater than or equal to 7 indicate an NDE. See Table 1.

**Table 1**  
The Greyson (1983; 1985) NDE scale.

Patient Questions	Weighted Alternative Answers
1. Did time seem to speed up or slow down?	0 = No 1 = Time seemed to go faster or slower than usual 2 = Everything seemed to be happening at once
2. Were your thoughts speeded up?	0 = No 1 = Faster than usual 2 = Incredibly fast
3. Did scenes from your past come back to you?	0 = No 1 = I remembered many past events 2 = My past flashed before me, out of my control
4. Did you suddenly seem to understand everything?	0 = No 1 = Everything about myself or others 2 = Everything about the universe
5. Did you have a feeling of peace or pleasantness?	0 = No 1 = Relief or calmness 2 = Incredible peace or pleasantness
6. Did you have a feeling of joy?	0 = No 1 = Happiness 2 = Incredible joy

7. Did you feel a sense of harmony or unity with the universe?  
 0 = No  
 1 = I felt no longer in conflict with nature  
 2 = I felt united or one with the world
8. Did you see, or feel surrounded by, a brilliant light?  
 0 = No  
 1 = An unusually bright light  
 2 = A light clearly of mystical or other-worldly origin
9. Were your senses more vivid than usual?  
 0 = No  
 1 = More vivid than usual  
 2 = Incredibly more vivid
10. Did you seem to be aware of things going on elsewhere, as if by extrasensory perception (ESP)?  
 0 = No  
 1 = Yes, but the facts have not been checked out  
 2 = Yes, and the facts have been checked out
11. Did scenes from the future come to you?  
 0 = No  
 1 = Scenes from my personal future  
 2 = Scenes from the world's future
12. Did you feel separated from your body?  
 0 = No  
 1 = I lost awareness of my body  
 2 = I clearly left my body and existed outside it
13. Did you seem to enter some other, unearthly world?  
 0 = No  
 1 = Some unfamiliar and strange place  
 2 = A clearly mystical or unearthly realm
14. Did you seem to encounter a mystical being or presence, or hear an unidentifiable voice?  
 0 = No  
 1 = I heard a voice I could not identify  
 2 = I encountered a definite being, or a voice clearly of mystical or unearthly origin
15. Did you see deceased or religious spirits?  
 0 = No  
 1 = I sensed their presence  
 2 = I actually saw them
16. Did you come to a border or point of no return?  
 0 = No  
 1 = I came to a definite conscious decision to 'return' to life  
 2 = I came to a barrier that I was not permitted to cross; or was 'sent back' against my will.
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One controversy surrounding reports of NDEs related to cardiac arrests is the indication from electroencephalography tests that brain activity will cease within 20-30 seconds of cardiac arrest (Parnia 2014; Parnia et al. 2014). This indicates the possibility of mental experiences with no corresponding brain activity. No doubt, critiques such as Mobbs and Watt (2011) propose that neurobiology can explain all NDEs related to cardiac arrest while all memories of NDEs formed before or after the temporary cessation of brain activity. I continue to analyse Mobbs and Watt (2011) in the next section.

## **5. Mobbs and Watt on NDEs**

Mobbs and Watt (2011) note that 3% of the public had NDEs, and the authors propose that neurobiology can explain all NDEs while they explain five features of NDEs, that is, (1) an awareness of being dead, (2) out-of-body experiences, (3) a tunnel of light, (4) meeting deceased people, and (5) positive emotions. The authors also refer to a case study of a female patient during a hypoglycemic episode with no cardiac arrest. The patient was in a dream-like state with rapid eye movement (REM) and recounted memories from her episode that are classic features of NDEs. This indicates a case of an NDE during a REM dream state. The authors inform us of important discoveries in neuroscience that need consideration when analysing NDEs, but the explanations are not exhaustive.

Here is a summary of Mobbs and Watt's neurobiological explanations for five features of NDEs:

1. *An awareness of being dead* is imagined by patients with Cotard's syndrome, which is a rare condition that sometimes causes delusions of being consciously dead.

2. *Out-of-body experiences* are often described as feelings that one is floating outside of one's body and sometimes *autoscopy*, which is seeing one's body from above. Case studies indicate that out-of-body experiences can occur during (1) interrupted sleep patterns, (2) vivid hallucinations while awake, or (3) artificial inducement.
3. Envisioning *a tunnel of light* can be artificially induced.
4. *Meeting deceased people* is similar to Alzheimer's and Parkinson's patients suffering from vivid audio and visual hallucination of ghosts or monsters.
5. *Positive emotions* can be induced by medicinal and recreational drug use.

Greyson, Holden, and van Lommel (2012) responded. They affirmed that NDEs are completely natural phenomena and that research of how neurophysiology correlates to NDEs is important. They also criticised Mobbs and Watt (2011) for (1) ignoring aspects of NDEs that they could not explain and (2) overlooking a substantial body of empirical research on NDEs. For example, neurophysiological models do not explain lucid experiences that occur during cardiac arrest when consciousness should be fragmentary or absent. Also, their response cited Holden (2009) who says that there are 107 qualitative cases of resuscitated patients who reported the perception of events they should not have been able to perceive, while investigation indicated that 91% of the events were completely accurate.

Finally, Mobbs (2012) responded to Greyson, Holden, and van Lommel (2012) by saying that there is nothing substantial in the academic literature about NDEs because there are only anecdotes and questionnaires. Mobbs also criticised the use of the term *paranormal* in NDE research in medical journals to imply that some mental phenomena is outside a reductionist framework of natural science because *paranormal* commonly means beyond scientific investigation.

Mobbs's (2012) criticism of research questionnaires is noteworthy because it signifies the colloquial hierarchy of *hard* sciences and *soft* sciences. For example, hard science is associated with the natural sciences, quantitative research, and controlled experiments; while soft science is associated with the social sciences, qualitative research, and open-ended questionnaires.

Setting aside unfair generalizations of hard and soft science, all sets of quantitative data do not have the same quality. Consider the following examples of data in the field of medical neuroscience: results from heart monitoring, brain monitoring, MRIs, x-rays, tissue cultures, blood tests, and closed-ended questionnaires about individual perspectives. Data sets from medical questionnaires are vital for medical science while they contain a subjective element of individual perspectives unlike most other data sets from medical research (Jones, Baxter, and Khanduja 2013). I suppose that the subjective element of questionnaires is a factor that prompted Mobbs (2012) to criticise that NDE research uses nothing more than anecdotes and medical questionnaires.

Regardless of the limits of medical questionnaires, as previously cited, Holden (2009) noted that there are 107 qualitative cases of resuscitated patients who reported the perception of events they should not have been able to perceive, while investigation indicated that 91% of the events were completely accurate. Also, as previously noted, neurophysiological models do not explain lucid experiences that occur during cardiac arrest when consciousness should be fragmentary or absent. Furthermore, no conceivable technology could detect if mental activity apart from brain activity is existent or nonexistent, so mixed methods of structured questionnaires and qualitative research is the best possible approach to research the question.

## 6. AWARE Results

AWARE was a four-year multicenter clinical study that focused on the cognitive deficits of patients who survive cardiac arrest (Parnia et al. 2014). The cognitive deficits include post-traumatic stress disorder (PTSD). The study used structured interviews to explore if mental experiences during CPR had contributed to the cognitive deficits. For example, anecdotal reports in qualitative studies indicate that a broad range of mental experiences including awareness is associated with CPR, while AWARE is the first systematic study of the mental experiences.

Consider the following results:

1. No patient exhibited signs of clinical consciousness during cardiac arrest, while previous research indicates that brain activity completely ceases with 20-30 seconds of cardiac arrest.
2. The study recorded 2,060 cardiac arrests; 330 of the patients met the eligibility for participation; 140 of the patients completed stage 1 interviews; 101 of the stage 1 interviewees completed stage 2 interviews.
3. Stage 1 interviews reported that 55 of the 140 patients recalled detailed memories during cardiac arrest.
4. Stage 2 interviews reported memories of the following: events in the hospital room, peace, unity with the universe, bright light, senses more vivid than usual, extrasensory perception, feeling separated from their body, entering an unearthly world, encountering a mystical being or presence, family, animals, plants, fear, and violence or persecution.
5. Stage 2 interviews reported that 9 patients had an NDE; 2 of the patients with an NDE had an out of body experience with *visual awareness* of events in the hospital room.

6. One of the 2 patients who reported visual awareness was healthy enough for a stage 3 interview; medical records and the third interview verified that the patient accurately recalled events that he reported to see during his cardiac arrest in the hospital room.
7. The verified visual awareness during an out of body experience does not suggest that the out of body experience was hallucinatory or illusionary.
8. Previous studies suggest mental experience that corresponds to no brain activity.
9. Neuroscience has no known etiology for mental experience that corresponds to no brain activity.

Although no patient demonstrated clinical signs of consciousness during CPR as assessed by the absence of eye opening response, motor response, verbal response whether spontaneously or in response to pain (chest compressions) with a resultant Glasgow Coma Scale Score of 3/15, nonetheless 39% (55/140) (category 2) responded positively to the question "Do you remember anything from the time during your unconsciousness?" (Parnia et al. 2014, 1802)

Cardiac arrest patients typically indicate no conscious responsiveness unless resuscitated. Also, electroencephalography tests indicate that brain activity ceases within 20-30 seconds of cardiac arrest. The window of 20-30 seconds evidently involves diminishing brain activity without possible responsiveness. The study examined the patients for evidence of mental activity and specifically awareness during the period of time with no brain activity.

One element of the test yielded no results. The four-year study took place in 15 hospitals while 50 to 100 shelves were installed in areas where cardiac arrest resuscitation would likely

occur, for example, acute medical wards. Each shelf contained one easily identifiable image that was visible only from above, such as looking down from the ceiling. The plan was to evaluate possible visual awareness during cardiac arrest with the image acting as a visual marker. However, only two of the patients reported visual awareness during cardiac arrest and those two cases of cardiac arrest occurred in non-acute areas without the shelves.

Regardless of the study generating no data for visual awareness during cardiac arrest in rooms with shelves, the other data is important. For example, 55 of the 140 interviewed patients reported memories during the time of clinical unconsciousness; 9 patients who reported memories scored 7 or more points on the NDE scale, which indicates an NDE; and 2 NDE patients reported visual awareness while feeling separated from their body. Only 1 of the 2 patients who reported visual awareness during cardiac arrest felt healthy enough for a stage 3 interview. The single stage 3 interview and medical records indicate that the patient accurately reported events in the hospital room during his cardiac arrest. Likewise, the stage 3 interview and medical records suggest that the visual awareness was not a hallucination or illusion.

The authors concluded that cardiac arrest survivors experience a broad range of experiences that include peace, fear, and awareness. While reports of explicit awareness are rare, it is unclear if these experiences contribute to PTSD. Also, additional studies are needed to determine the role of explicit and implicit memory during cardiac arrest and the impact of this phenomenon on the occurrence of PTSD and other life adjustments among cardiac arrest survivors.

## **7. Discussion of Two Propositions**

I conclude by discussing Propositions 2 and 3 which are mutually exclusive to each other:

(2) All reports of memories from experiences during temporary death involve an illusory recollection of chronology while the origin of all the memories occurred before or after the temporary cessation of brain activity.

(3) Some mental activity occurs with no corresponding brain activity, especially postmortem.

Propositions 2 and 3 are mutually exclusive to each other while each proposition has one truth value, that is, completely true or not completely true. Mobbs and Watt (2011) and Mobbs (2012) imply that Proposition 2 is completely true. Alternatively, Parnia et al. (2014) imply that Proposition 3 is completely true.

A proponent of reductive naturalism necessarily agrees with Proposition 2. Despite Greyson, Holden, and van Lommel (2012) implying that a postmortem mental mechanism is completely natural, such a proposal would never be considered by a reductive naturalist because no conceivable technology could detect a postmortem mental mechanism.

Alternatively, liberal naturalists consider the possibility of inferring the existence of an unobservable entity. Few might have reasonable doubt in Proposition 2 because of the following Propositions 4–5:

(4) Neuroscience indicates that the consciousness of cardiac arrest patients should be fragmented or absent, but a significant minority of cardiac arrest patients report lucid memories from their period of temporary death.

(5) A survey indicates that multimillions of people believe that they have memories that originated during temporary death.

The majority of liberal naturalists might reject that Propositions 4–5 indicate reasonable doubt in Proposition 2 because of the frailty of human memory, the brain's ability to hallucinate, and evidence that some NDEs occur during REM. Nonetheless, I want to explore the implications of doubting Proposition 2. First, a post-mortem mental mechanism would be an unobservable mental mechanism. Second, a few philosophers of mind propose the existence of a postmortem mental substance in the context of *emergent dualism*, for example, Hasker (2001; 2018) and Zimmerman (2010). Likewise, the AWARE proposal of mental experience with no corresponding brain activity can be discussed in the context of emergent dualism.

Emergent dualism is a type of substance dualism. Substance dualism says that living humans possess a biological body which is a physical substance and a mind or soul which is a nonphysical substance; while the physical and nonphysical work together. The most prominent type of substance dualism is Cartesian dualism which says that each human soul is a special creation, but the special creation of each human soul incoheres with liberal naturalism. However, emergent dualism says that the human brain naturally generates the human mind, while the brain and mind work together in consciousness and other cognitive processes till death do they part.

I appreciate the concept of emergent dualism, but I prefer to shift the language. First, I disagree with dividing the universe into physical substance and nonphysical substance. For example, I shy to say that an organically generated mental substance is nonphysical. Consider my section 2 description of gravitational interaction. The cause of gravity is an unobservable entity but nonetheless a fundamental interaction of physics with powerful and ubiquitous effects.



Similarly, I prefer to say that the human mental substance is a physical but unobservable substance. Second, I prefer to say that the biologically living human mind is an observable-unobservable dualism. The brain is the observable mental mechanism while what emergent dualists call the *nonphysical substance, soul, or spirit* is the unobservable mental mechanism.

I also compare the possibility of an observable-unobservable dualism of mind to the dualisms of jurisprudence and economics. For example, political entities such as a city or a sovereign state are a type of legal person, while every settled political entity has a defined territory, a human population, and a government. The territory and human population are observable entities while the government is an unobservable entity. Regardless that any government is unobservable, all major schools of jurisprudence define that a codified political entity is a concrete entity. Also, jurisprudence and economics define two top types of property, that is, tangible property and intangible property. Tangible property is anything that can be touched while intangible property include financial assets and intellectual property. The documentation of a piece of intangible property might be tangible, but the property is nonetheless intangible. Regardless that any piece of intangible property is unobservable, the fields of jurisprudence and economics define that a piece of intangible property is a concrete entity. Furthermore, Goetz (2016, 132) defines that any government or any piece of intangible property are a *physical entity* because they foremost derive their existence from the fundamental interactions of physics. Additionally, the effects of governments and pieces of intangible property are evident:

Despite the intangible nature of government, research of past and current phenomena indicates strong evidence that legal persons sometimes generate enormous force. Great

nations rise and fall. Government officials declare war and armies fight with tangible weapons. Legal persons buy and sell property. Universities grant academic degrees. A cartoon character is intangible property that generates multibillions of US dollars per year. Banks and law enforcement foreclose mortgages of family residences. Governments and economies around the world operate according to the logic of law. (Goetz 2014, 36; 2016, 132–33)

Moreover, social scientists measure the distributions and influences of governmental power.

Jurisprudence and economics are evident examples in the social sciences of observable-unobservable dualism while the unobservable entities such as governments and pieces of intangible property are organically generated. These cases of dualism cohere with liberal naturalism and compare to my proposal for the possibility of the observable-unobservable mind. One major difference between an unobservable mental mechanism and a government or piece of intangible property is that the survival of governments and economics is dependent on the survival of biological humans while the survival of unobservable mental mechanisms is not dependent on the survival of biological humans. Another major difference between an unobservable mental mechanism and a government or piece of intangible property is that the existence of governments and pieces of intangible property is far more evident than the existence of unobservable mental mechanisms. Section 3 describes the no miracles argument for scientific realism and applies it to the majority of basic scientific theory taught in contemporary natural science textbooks in all of the inhabited continents. The no miracles argument can also apply to the reality of governments and pieces of intangible property because of the obvious evidence and

worldwide consensus. However, the no miracles argument does not apply to controversial proposals such as mental experience with no corresponding brain activity and emergent dualism. Nonetheless, mere reasonable doubt in Proposition 2 indicates the possibility of naturally generated unobservable mental mechanisms.

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