

# Free Will: Philosophy, Psychology and Simulated Driver Behaviour.

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## **Statement of Candidate**

I hereby confirm that all material contained in this project are my original authorship and ideas, except where the work of others has been acknowledged or referenced. I also confirm that the work has not been submitted for a higher degree to any other university or institution. The research project was approved by the Macquarie University Human Research Ethics Committee (Approval No. 5201951267688). Signed: *JO'Neill*

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## Summary

Free will and its consequences have been studied for millennia. Although traditionally bound to the field of philosophy, the notion of free will has become salient in experimental psychology in recent years. This is largely due to the discovery that lowering belief in free will has deleterious behavioural consequences. The entailments of some types of determinism furthermore, constitute a defeater for some psychological theories of motivation. This paper addresses both of these considerations. Firstly, arguments for determinism are shown to be unsound and thus, the entailments relevant to psychology do not obtain. Secondly the results of an experiment seeking to determine the relationship between belief in free will and driver behaviour are reported. Results were non-significant. Given that significant effects have been widely reported in other conceptually related studies, the discussion considers misunderstandings regarding the replication process.

## Introduction

The concept of free will has fascinated philosophers and theologians alike throughout the centuries. It was not until relatively recently that the notion of free will has become explicitly pertinent to psychology. Areas of psychology have, to some degree, presupposed the existence of free will particularly in its clinical form where treatments such as cognitive behaviour therapy assume that some form of volitional reason within the mind can affect physical behaviour (Haidt & Lukianoff, 2018). This holds true with the establishment of neuroplasticity as a working concept, whereby beliefs may alter physical neural circuits in the brain (Doidge, 2010). On the other hand, *determinism*, as an alternative to agential free will has become increasingly popular in psychology as Wegner's (2017) book *The Illusion of Free Will* illustrates. Interest within psychology has shifted however from a perennial

ontological question bound to the realm of philosophy, to the concept of belief in free will. In particular, how such a belief affects behaviour. Multiple studies have found that not only can belief in free will be manipulated, this manipulation can alter certain behaviours (Rigoni, Wilquin, Brass & Burle, 2013; Baumeister, Masicampo & DeWall, 2009). Two major findings stand out from the literature, namely; decreasing belief in free will increases cheating (Vohs & Schooler, 2008) and conformity (Alquist, Ainsworth & Baumeister, 2013).

The following paper may be read as two distinct sections. The first section outlines the consequences of determinism for psychology and attempts to make some progress in the stalemate regarding the ontology of free will. The consequences of which have implications for psychological theories which presuppose agential control. Within this section, a brief history of the development of free will as a concept in Western philosophy is reported. Secondly, a general argument used against free will is refuted and *compatibilism* as a solution to the problem of free will is shown to be logically unsustainable. Thirdly, determinist arguments stemming from *reductive materialism* that rule out the existence of mental events are shown to be unsound. Fourthly, the combined *non-reductionist* account of determinism utilising evidence from Libet, Gleason, Wright and Pearl, (1983) is shown to be logically invalid. No argument defending free will is posited, nonetheless the consequences of determinism for psychology do not obtain, given that the major arguments against free will are demonstrably fallacious. The second section seeks to summarise and report results from psychological studies, including the present study, on belief in free will. An overview of the research on folk beliefs in free will is covered. Previous research in behavioural effects of belief in free will and its relevance to the current study is then surmised. Results of the current study are then reported. Although the findings were non-significant, the salience of replications in the field are discussed. Finally, future directions for research are suggested.

## Historical Overview

The concept of free will in the Western world stretches back to Ancient Greek philosophy and practice (Cary, 2007). Plato (trans. 1956), being one of the first philosophers to propound the conceptual ingredients to the notion of free will, made two key assertions in his *Republic*. Firstly, as Cary (2007) points out, Plato (trans. 1956) identifies two components of the soul. One that deals with rationality and another that deals with the irrational passions. The rational aspect has governance over the irrational passions, but this does not entail that all choices predicated on rationality are correct by necessity. Furthermore, passions in the Platonic model are construed as inaction, that is, occurring to an individual without consent, thus pushing the individual toward certain behaviour that is necessarily chosen. As Cary (2007) effectively argues, this notion of rational inhibition is a seminal predicate for Western conceptions of legal responsibility.

Plato's (trans. 1956) work is also pertinent to the philosophical and theological concept of dualism, in particular, substance dualism. In his Socratic dialogue *Meno*, he elucidates his theory of knowledge by describing an interaction between Socrates and a slave. During this dialogue, he demonstrates, with calculated questioning, that individuals do not learn, rather they remember. For Plato (trans. 1956), the soul is an immortal substance that has achieved all knowledge. When an individual learns something, they are in actuality unlocking a pre-existing memory. There is a veil ambiguity regarding Plato's (trans. 1956) conception of the soul, in that the protagonist, Socrates, seems to question the very idea he posits, particularly in *Apology*, leading to a somewhat contradictory stance (Lorenz, 2009). Nevertheless, this basic dichotomy is somewhat akin to theological understandings, of a separate, and immortal soul inhabiting a physical body (Craig & Moreland, 2003). It should be noted that describing Plato's (trans. 1956) view on the subject as 'dualism' is anachronistic. Pricopi (1999) for instance argues that based on Plato's (trans. 1956) written work alone, he must be considered

a monist. Nonetheless his works were seminal for soul theorists and rationalists in the enlightenment period.

Aristotle is often noted for his metaphysical theories which held prominence in European academic thought until they were gradually replaced due to challenges by Copernicus and notably, Galileo in the 16<sup>th</sup> and 17<sup>th</sup> Centuries (Dear, 2001). However, Cary (2007) points to Aristotle's (trans. 1978) teachings on virtue and action as being significant in the development of the concept of free will. He developed a description of morality that can be displayed in the form of active deductive argumentation where desire leads to belief, which then leads to behaviour (Aristotle, trans. 1978; Cary, 2007). This is sufficient for the animal kingdom; however, humankind can advance this a step further. Humankind uses reason to make both rational and honourable judgements, which lead to belief and finally behaviour. The individual desires and performs judgements because they perceive the good; a good which exists externally (Aristotle, trans. 1978). Note that this model of free action is devoid of volitional power (Cary, 2007). Once a judgement is formed, it becomes a belief which in turn becomes action.

Furthermore, Aristotle (trans. 2014) developed a hierarchy of causation. Aristotle (trans. 2014) claims in his *On the Generation of Animals* that there are four kinds of causes; final, formal, material and efficient. Final causes are those that require human reason and volition; that is, the ability to conceive of and enact plans (Ansoff, 1993). Whilst formal, material and efficient causes are prevalent in nature, final causes are unique to humanity and the predicate of autonomous action (Aristotle, 2014).

Thus, the previous figures of Greek antiquity have generally supported some version of free choice based on reason. This is somewhat analogous to the current debate; however, it should be noted that the concept of the 'will' or 'volition' was not established in Greek antiquity,

rather, freedom was based on unimpeded choice (Cary, 2007). This perspective however was not shared by all prominent Greek thinkers. Democritus and Epicurus for instance, developed early atomic theory which resembled Newtonian physics to some degree, and was predicated on the notion that atoms, or small particles, moved around in particular ways (Purinton, 1999; Cary, 2007). These movements are determined by weight and collision (Purinton, 1999; Cary, 2007). This model thus entailed physical determinism, just as Newtonian mechanics is held by some to entail physical determinism (Swinburne, 2013). This model then, applied to the brain would imply a determinism that would negate free will. To avoid this consequence, a slight modification was made by Epicurus, whereby atoms were held to inexplicably swerve from their set course, which allowed for an indeterminism. This made free will possible when applied to the brain of both humans and animals (Purinton, 1999; Cary, 2007). This arbitrary solution was heavily criticised by opponents as being *ad hoc*, and as such, Epicurean atomic theory had created a problem for free will analogous to the problem physical determinism poses to free will today (Cary, 2007).

Another component of Greek culture that established a stance on free will was the concept of ‘fate’. This was particularly salient in Greek drama as Cary (2007) emphasises with recourse to the play *Oedipus Rex*. An oracle is given regarding the fate of Oedipus in which multiple characters hear and therefore attempt to impede. Nevertheless, despite all of their best efforts, the prophecy is established in the most unlikely fashion. The sweeping generalisations that some scholars such as Cary (2007) draw from this example are not entirely justified. For instance, he claims that; ‘This is exactly how the Greeks expected fate to work:...no matter what else happens you will eventually end up accomplishing what is fated for you’ (p.167). The fact that the Greeks took prophecies seriously is not disputed, however there are two circumstances that draw into question the legitimacy of such a far-reaching claim about free will in antiquity. Firstly, as Maurizio (1997) makes clear, the intended audience had a large



amount of influence on the performer's pronouncement. For instance, oracles handed down by the Pythia at Delphi had to be agreed upon and accepted by the receiver in order for it to maintain legitimacy. An example of this occurs during the second invasion of Greece under Xerxes (480 BC). Herodotus (trans. 2003) in his *Histories* records that the Athenians sought a prophecy concerning the outcome of the conflict. When they received one that appeared disastrous, they went back to ask for another. Not only does the subsequent prophecy appear more promising, but the interpretation is construed in a favourable way by the Athenian General Themistocles in order to gain support for his military tactics (Maurizio, 1997). This indicates that fate was somewhat flexible in the eyes of the Ancient Greek populace. If a prophecy was not favourable another request may be made, or a creative interpretation may be applied eliciting a fluid, not rigid conception of fate. It is perhaps best summarised by Marchais-Roubelat and Roubelat (2011) describing the oracle received by Croesus of Lydia; 'There is an element of determinism linked to the revelation, but also an element of free will, of men and gods, who may partially influence their destiny...' (p.1495).

Despite these developments in antiquity it was not until Augustine (1964), writing in the 2<sup>nd</sup> Century, that the notion of an independent faculty of the will was postulated (Cary, 2007). As stated earlier, Aristotle (trans. 1978) had discussed the capacity for free choice; decisions unimpeded by influences. Yet Augustine (trans. 1964) took a further step in positing the existence of a power separate to that of rationality and reason, that could effectively bring about desired effects (Cary, 2007). Augustine (trans. 1964) believed that this power was degraded by sin (Stump, 2014). Nonetheless, individuals have free will and are morally responsible for their behaviour. The degradation comes from the fact that they always override the 'good' for moral choices they desire that are 'evil' (Stump, 2014). For Augustine (trans. 1964) then, it was only God's grace, freely given, that could heal the faculty of the will such that it could function properly (Stump, 2014). Therefore, the Augustinian

perspective holds that all individuals are endowed with the power of the will, but it is only functional in those to whom God has extended grace (Stump, 2014).

Thus, although rudimentary, the four essential ingredients for the concepts involved in the contemporary free will debate can be traced back to antiquity. Plato (trans. 1956) and the conception of the Soul or mind provided the foundation for dualist interactionism. Aristotle (trans. 1978) provided the grounds for the importance of rationality and reason, necessary for free decision making. Democritus and Epicurus developed one of the earliest versions of determinism based on *necessary causation* working with physical causes outside of the brain (Cary, 2007; Purinton, 1999). And Augustine (trans. 1964) postulated the concept of volition or will power as a separate faculty of the mind that could bring about desired effects.

### Philosophy of determinism

This section seeks to navigate through the terminology surrounding free will and provide a coherent definition. It will then critique the major claims from the general argument for determinism, and then the *reductive materialist* and *non-reductive epiphenomenalist* account of determinism. Although not forwarding positive arguments for free will, the major arguments in favour of determinism are shown to be unsound, leaving open the plausibility of psychological theories of motivation such as goal – theory and self – regulation. The latter is of particular relevance as theories of self-regulation whether, *social cognitive* or *volitional* are realist in their position on agential control. Individuals are not only self – aware but they are able to intentionally alter their behaviour (Zimmerman, 2013; Butler, 2002; Wolters, Garcia, McCann, Turner & Roska, 1998).

Within contemporary philosophy surrounding free will, the key debate focuses less on the reality of free will and more on the relationship between free will and determinism – in particular whether free will comports with determinism (Gomes, 2007). Broadly speaking there are two positions on this; *incompatibilism* and *compatibilism*. Incompatibilism holds that free will and determinism are mutually contradictory, that is, the truth of one entails the falsity of the other. Thus, *libertarians* maintain that individuals do have free will and can act freely whilst incompatibilist determinists or *necessitarians* hold that individuals do not have free will as the universe is governed by unalterable causal chains leading back to time-space genesis or, if the universe is eternal, infinitely regressing into the past (Van Inwagen, 2017; Swinburne, 2013). Both positions face difficulties. Libertarians are generally coerced into some form of dualism even when stringently denied (Gomes, 2007). Historically, determinists have found it difficult to ascribe moral responsibility when causes originate from outside an agent (Van Inwagen, 2017). On the other hand, compatibilism is the doctrine that free will and determinism are compatible and do not hold antithetical entailments.

Compatibilism can be seen as an intuitive acceptance of free will in order to accommodate moral responsibility with scientific determinism (Ansoff, 1992). Determinism in this sense is construed as *physical determinism* which maintains that every physical cause has an antecedent physical cause which is both a *necessary* and *sufficient* condition for the latter (Swinburne, 2013). These causal chains stem from the time/space beginning of the universe. In contemporary atomic physics, some level of uncertainty has now been cast regarding the predictability of certain events. Specifically, the *Heisenberg Indeterminacy Principle* maintains that particles on the quantum level have a limit on the precision with which one can measure pairs of physical quantities (Jeeves, 2013). The momentum and present position of a particle cannot be measured to a joint accuracy greater than  $h/4\pi$  ( $\Delta p \cdot \Delta q \geq h/4\pi$ ), with  $h$  being Planck's constant (Swinburne, 2013). This *indeterminist* account could apply to systems

operating on the macro level, therefore, affecting the brain and undermining the doctrine of physical determinism as a system by which human behaviour is predicted and constrained. Proponents that cite this objection as a pathway to free will face two problems. Firstly, it has been argued that although there is imprecision in predicting events at the quantum level, this averages out on the macro level, at which the brain operates, rendering these effects entirely insignificant (Weatherford, 1991; Kane, 1998). Thus, all events on the macro level conform to a certain form of determinism. Whether this turns out to be the case or not, is still to be seen. Regardless, the second problem which refutes the possibility of quantum indeterminacy providing a foundation for free will, is that indeterminacy or randomness is not free will (Gomes, 2007). For example, a compatibilist appealing to indeterminism as reconciliatory is construing free will as an absence of determinism. Free will becomes a privation. This however is at odds with theories of motivation, where action is not only an effortful initiation from the subject but sustained over time (as delineated by psychological theories such as self-regulation (Brydges & Butler, 2012)). The absence of physical determinism is therefore insufficient to qualify as a basis for free will. Free will rather is ascribed to an '*I*', '*self*', or '*rational agent*' (Gomes, 2007; Kane, 1998). The actions derived from the free will account are therefore not based on randomness or indeterminacy, rather wilful intention or volitional control (Kane, 1998; Zhu, 2004).

Furthermore, it is important to distinguish volition from intention, indeed there has been a pattern within philosophy that construes volition as equivalent to intention (Zhu, 2004). Zhu (2004) posits a plausible demarcation between intention and volition, the former being a state and the latter being a process. Intention as a state, is prior and necessary for volitional action to take place. For instance, an agent would first form an intention to *engage in goal x*. The intention, although necessary for the volitional process to initiate, is not sufficient to make the proposition *engage in goal x* obtain. Rather a process of conscious volitional control,

triggered by the intentional state, is then engaged, which is sufficient to make the proposition obtain, if it is within the agent's causal capabilities. A further role of volition is to sustain conscious action until goal  $x$  has been brought to completion (Zhu, 2004). This is of particular importance when pursuing distal goals as compared to proximal goals (Zhu, 2004). Thus, volition can be seen as *willpower* whereas intention can be seen as the precursory state that enacts and activates volitional power to engage in a certain action. Zhu (2004) includes a further distinctive component, namely, decision making as a separate process. This is where freedom of choice is used to select an intentional state. This three-component model preserves freedom of choice and volitional power, in keeping with motivational theories, but does not necessitate that the causes originate within the agent; although that is a possibility. This can be further synthesised into a *property – event dualist* model. Property – event dualism holds that the brain is one substance composed of two properties; namely *Neurophysiological* (NP) properties and *content* properties. NP properties are physical brain states and processes on the cellular level and content properties are non-material mental states that exist as emergent properties (Plantinga, 2011). This form of dualism can be defined through events, so that a brain event is a publicly accessible physical event, whereas a mental event is a privately accessible introspective event (Swinburne, 2013). Public events are events that can be observed and verified by other agents, whereas mental events are open only to the individual who experiences such an event (Swinburne, 2013). This theory itself says nothing about causation and thus nothing about free will. It is however often coupled with *epiphenomenalism* which maintains that content properties supervene on NP properties. Therefore, according to the epiphenomenalist, content properties or *mental events* are offshoots of their correlating neural properties. They are however, causally powerless as they are separated from the continuum along which NP properties or *physical* events lead to behavioural changes and actions. Given that indeterminism is deficient as an explicator of

free will due to its supposition that ‘chance’ or ‘randomness’ are sufficient to allow for free will (Weatherford, 1999), a cogent definition must go beyond ‘chance’ at the atomic level and address volitional capacities. Traditionally, the concept of free will has been closely associated with the notion of reason, which itself has been separated into two categories, namely theoretical reason or *intellectus* and practical reason or *voluntas* (Kane, 1998).

Theoretical reason addresses propositional knowledge or descriptive truths such as ‘snow is white’, whereas practical reason is further separated into two components; normative judgements and decisions (Kane, 1998). The normative component is predicated on ‘ought’ contexts derived from morality and the decisional component is driven by ‘will’ contexts, indicating what will be done in non-moral choosing situations (Kane, 1998). The presuppositional foundation that all of these notions assume is the reality of a ‘rational self’ or ‘agent’. Thus, free will for the purposes of this paper will be held to be; *a state of reality whereby individuals can freely select and engender certain physical and mental actions from a finite set of potentials*. Furthermore, individuals can use *sense perception* and the *deliverances of reason* in deciding on a course of action thus overriding influences from external and internal factors. This definition does not entail that all causes are endogenous, rather, within the property – event dualist model, all causes may be traced back to unconscious brain events. Nonetheless after NP properties have evoked the necessary content properties, the content state has logical freedom to select and pursue the desired, and feasible, goal irrespective of second-factor influence. With this definition established, the main defeaters for the above position, which include the generalised case, *reductive materialism* and *non-reductive materialism* in conjunction with Libet et al. (1983) type evidence can now be addressed.

As a preliminary, determinism can be demarcated into two general categories. Top-down determinism and physical determinism. Top-down determinism stems from theological

notions of God or some deity that has the property of *omniscience* (Craig, 2000). This entails that every past, present and future event is known or foreknown (depending on tense) by God or some deity. This includes the counter-factuals or subjunctive conditionals of free will (*if* → *then* statements in subjunctive tense (Comesana, 2007)). If this is true then, on an intuitive level, it seems that any future action made by an individual is not truly free (Roskies, 2006). If such a being exists, they must foreknow person A's future action at time *t*, so that it is not possible for person A to restrain from such a future action at time *t*. However top-down determinism in this sense is largely irrelevant to the current discussion for two reasons. Firstly, there is a misunderstanding of the problem. Roskies (2006) for instance characterizes the nature of the problem as the existence of a '...God [who] is omnipotent and controls our actions...' (p. 419). However, it is no part of the religious world view of at least some major religions to claim that God 'controls our actions' (Craig, 2000). The problem rather, is that God or a deity is said to 'know' all things (Craig, 2000). Thus, knowledge is confused with causation. Due to this, some philosophers of religion claim that God or a deity must self – censor their omniscience in order to allow logical space for human free will; a theory known as divine self – limitation (Swinburne, 2016). This, however, confuses the relationship between knowledge and cause. To *know* something is not to *cause* something. The top-down determinist typically argues;

- 1) Necessarily, if God foreknows *x*, then *x* will happen.
- 2) God foreknows *x*.
- 3) Therefore, *x* will necessarily happen.

(Craig, 2000 p. 72).

The conclusion 3 however, does not follow from the two premises. It cannot be deduced that *necessarily x* will happen, only that *x* will happen denoted below;

- 1) Necessarily, if God foreknows  $x$ , then  $x$  will happen.
- 2) God foreknows  $x$ .
- 3) Therefore,  $x$  will happen.

(Craig, 2000 p. 73).

Thus, the foreknowledge of God is chronologically prior to  $x$  but logically post  $x$  (Craig, 2000). In this case,  $x$  may fail to occur, yet God would foreknow this. Therefore top – down determinism is based on a mischaracterisation of knowledge and causation.

Secondly, the entire structure of top-down determinism is built on the premise that a God or deity of some kind exists. If God or some deity does not exist, then top-down determinism is false. Ergo, the *metaphysical naturalist* who denies the existence of God does not face a defeater for belief in free will. Given that the natural sciences, including psychology proceed with the assumption of *methodological naturalism*, this objection becomes largely irrelevant (Lennox, 2009).

Multiple articles reporting on belief in free will either measured or manipulated make the diplomatic claim, that belief in free will in general, (and in particular their study) says nothing about the existence of free will (Aarts & van den Bos, 2011; Baumeister & Brewer, 2012). However, if belief in free will is construed as a motivator, as recent research has provided support for, then the concept of belief in free will automatically takes a position on the reality of free will (Ansoff, 1992). Furthermore, the consequences for the denial of free will are not limited to the realm of philosophy or law. There are entailments that affect various psychological theories. If free will is illusory, and individuals are causally powerless, particularly in relation to initiating and sustaining action, then motivational theories that presuppose this action such as goal – theory, self – regulation, and, as will be argued below, belief in free will itself (Husman & Corno, 2010; Baumeister, Masicampo & DeWall, 2009)



are rendered false by implication. Thus, establishing free will as a reality as well as an experience is relevant to the preservation of these theories. If the proposition '*human agents have free will*' were shown to be false it would act as an *undercutting defeater* for such theories of motivation. An undercutting defeater does not directly rebut a proposition A, rather it refutes proposition B (the reason to believe A is true) and therefore undermines one's reason to think A is true (Plantinga, 2011). In this case, proposition A is that 'psychological theories of motivation are true'. Proposition B is that 'human agents have free volitional power'. Truth in this sense means either that the concept genuinely refers or is verisimilar. Consider the following what is considered the general deductive argument, typically posited by the necessitarian (determinist). Let  $p$  be 'causally determined acts' let  $\sim p$  be 'uncaused acts' and let  $q$  be 'no acts are ever free'.

$$(1) p \rightarrow q \bullet \sim p \rightarrow q$$

$$(2) p \vee \sim p$$

$$(3) \therefore \sim \Diamond \sim q$$

(Lazerowitz, 1984, p. 10).

The first half of premise (1) is an incompatibilist claim and is not disputed in this discussion.

If all acts are causally determined then according to van Inwagen's (2017) *Consequence Argument* no acts are ever free. The second part of premise (1) is also cogent. If acts are uncaused and random, the implicit spontaneity means they cannot be a consequence of freely willed actions. The agent has no control over them (Lazerowitz, 1984). However, this argument appears to be fallacious by omission as it presents a false dichotomy. It is possible that another type of act is excluded from premise (1) namely 'undetermined, caused acts'.

Undetermined caused acts are acts of the will which are not causally determined by prior causes, as stipulated by the above definition of free will. They may be caused by prior causes

but the outcome is not determined. The above argument assumes either a *reductive materialist* or *non-reductive materialist* deterministic epistemology. Thus, premise (1) of the above argument rules out the possibility of undetermined caused acts in advance. Therefore, it is question begging.

Now one may make the assertion that compatibilism solves the problem posed by determinism as it purports to reconcile free action with a causally determined past (van Inwagen, 2017). Compatibilism faces a strong *a priori* objection rendering it an unlikely solution to the problem of free will. Take for instance the *Consequence Argument* postulated by van Inwagen (2017), according to which it is a necessary consequence of physical determinism that freely willed actions have never occurred and can never occur. Using the below two rules of inference, let '*p*' represent 'some event or action' and 'N' represent 'no one has or ever had any choice about whether *p*' (van Inwagen, 2017, p. 91). Let '*Np*' be the conjunction of the two.

$$\alpha \quad \Box p \mid \neg Np$$

$$\beta \quad Np, N(p \supset q) \mid \neg Nq$$

(van Inwagen, 2017, p. 91).

With these rules of inference, let '*P<sub>o</sub>*' represent 'the state of the world at a given time in the past. Let '*P*' describe 'any given true proposition' and let *L* be the propositional representation of the conjunction of the laws of nature. Thus the argument follows;

$$(1) \quad \Box((P_o \& L) \supset P)$$

$$(2) \quad \Box((P_o \supset (L \supset P))$$

$$(3) \quad N((P_o \supset (L \supset P))$$

(4) NP.

(5)  $N(L \supset P)$

(6) NL

(7) NP

(van Inwagen, 2017, p. 91).

Criticism from McKay and Johnson (1996) has rendered the above version of the *Consequence Argument* unsound. Specifically they showed that the  $\beta$  inference rule was invalid as they were able to provide a coherent counterexample to Agglomeration ( $Np, Nq \mid - N(p \& q)$  contra rule  $\beta$ ). With recourse to counterfactuals, they showed that there are possible circumstances where N could be false. An individual who could have committed an action with a conjunctive proposition that entailed the falsity of all possible outcomes does have choice regarding the truth value of that proposition. For instance, if an individual committed  $x$  then either  $a$  or  $b$  would be the consequent. However, from the individual's failure to commit  $x$ , an act that they were able to, it follows that they did have control over the truth value of the proposition ' $a$  did not occur and  $b$  did not occur' (van Inwagen, 2017). This refutation has been addressed by van Inwagen (2017) by reconstructing  $\beta$  to mean the following: ' $p$  and every region to which anyone has, or ever had, *exact* access is a *sub-region* of  $p$ ' (p. 99). Therefore, in logical space, any region,  $p, p \supset q$  and  $q$  to which a person has direct access (can verify the truth of that region) is a subregion of  $p$  and thus it is not possible that the conjunction  $Np$  could be false (van Inwagen, 2017). This renders  $\beta$  valid and thus the argument is sound. If this amendment proves successful then compatibilism is false and an incompatibilist thesis such as *necessitarianism* or *libertarianism* may be true. Given the failure of the prior argument for necessitarianism, the existence of free will is possible therefore preserving the current validity of psychological theories of motivation. The general

argument against free will then, does not seemingly pose a defeater for free will. The same holds for compatibilism.

As stated before, reductive materialism by definition rules out the possibility of free will, as the properties necessary to enact free will such as intentional states of consciousness, are categorised as illusory (Rosenberg, 2011; Plantinga, 2013). According to this view, only the material world exists including the brain, as composed by NP properties. At the cellular level, this means neuronal structures are sufficient to account for all brain activity. This position is susceptible to various charges, particularly the clear *reductio ad absurdum* of reductive materialism. Two arguments reveal that this position is logically untenable. Consider the following argument based on *Leibniz's law of the indiscernibility of identicals*  $(x)(y)[(x = y) \rightarrow (P)(Px \leftrightarrow Py)]$  'For any  $x$  and for any  $y$ , if 'they' are identical with each other, then for any property  $P$ ,  $P$  will be true of  $x$  if and only if,  $P$  is true of  $y$ .' (Moreland & Craig, 2003, p.194). If this is the case, then  $x$  and  $y$  are the same entity.

- (1) No physical properties are self-presenting.
  - (2) At least some mental properties are self-presenting.
  - (3) Therefore, at least some mental properties are not physical properties.
- (Moreland & Craig, 2003, p. 234).

Now consider the argument from a position of introspection:

- (1) If reductive materialism is true, I cannot think about anything.
  - (2) I am thinking about reductive materialism.
  - (3) Therefore, reductive materialism is false.
- (Craig & Rosenberg, 2013).

In order to deny premise (2) in both arguments and maintain that NP properties are identical to content properties; introspective experience must be denied. Introspective experience is not necessarily tantamount to evidence against a proposition. It could be that introspective experience does not match events in the actualised world such as instances of hallucination. However, experience in the sense of intentions implies a truth value (Swinburne, 2013). Truth claims and truth statements, asserted by an agent, are considered intentional and based on reason. This is distinct from unintentional and involuntary actions which create noise with no truth value, such as an episode of hiccups (Swinburne, 2013). If premise (2) is false on both versions of the argument, it follows that no proposition has any truth value. Any claim that reductive materialism is true can be equated with an unintentional and involuntary action; simply uncontrolled behavioural output from the brain at the neuronal level and therefore, devoid of meaning (Swinburne, 2013). Thus, if reductive materialism is true, any argument constructed to obtain its validity would be meaningless (Swinburne, 2013). The above arguments then appear sound, and reductive materialism false.

As referenced previously, non *a priori* arguments against free will often stem from Libet et al.'s (1983) experiment which purportedly provided the evidential basis for epiphenomenalism (Jeeves, 2013; Zhu, 2004; Frith, 2013; Swinburne, 2013; Tse, 2013). Libet et al. (1983) sought to explore potential connections between intentions and brain activity. Participants were instructed to monitor a clock and record time of intention onset, referred to as W time. Recorded intentions consisted of commitment to voluntary motor actions. During this process, brain activity was monitored using an electroencephalograph (EEG). This recorded an accrual of potential on the scalp known as the *readiness potential* (RP). RP is neural marker that precedes motor action. In order to increase construct validity, two conditions tested the accuracy of self – report measurements. M series assessed subjects'

report of awareness regarding actualised action. S series evaluated subjects' report of awareness of muscle stimulation at varying times. Both of these conditions allowed for self – report of awareness, an introspective phenomenon, to be measured against an external variable, namely actual time of movement and actual time of stimulus pulse. Results from both groups did not undermine the recorded RP relationship with W time. Given that self – report of intention awareness is empirically unverifiable, these measures increased the degree that causal deductions of this kind were warranted. Results pertaining to intention formation revealed that The RP preceded intention formation by approximately 200 – 400 milliseconds (Libet et al. 1983; Tse, 2013). Due to the fact that multiple sources claiming that Libet et al.'s (1983) research negates human free will in general (Zhu, 2004; Rosenberg, 2011; Wegner, 2017) it is important to clarify what Libet et al. (1983) themselves deduced from the experimental results although their own conclusions are somewhat ambiguous (Libet, 1985). Their main assessment was that, 'some neuronal activity associated with the eventual performance of the act has started well before (recallable) conscious initiation or intervention could be possible' (Libet et al., 1983, p. 640). This led them to conclude that their findings 'appear to introduce certain constraints on the potential of the individual for exerting conscious initiation and control over voluntary acts.' (Libet et al., 1983, p. 641). These claims are reasonably conservative regarding free will and Libet et al. (1983) were cautious to affirm that an agent may be able freely to 'veto' actions in the time gap between conscious entrance of awareness and actualisation of motor action. A phenomenon labelled *free won't* by some academics (Tallis, 2016). Furthermore, they drew the distinction between the types of tasks requested in their trials, namely spontaneous inconsequential acts and other types of tasks whereby an agent necessarily underwent a process of deliberation. It is also notable that Libet (1985) himself does not subscribe to a content epiphenomenalist theory of the mind (see Lindahl & Arhem, 2019, for an analysis and evaluation of his views). Rather, he posits a

conscious mental field (CMF) that has control over the brain processes after they have been initiated. Specifically, they can be selected or vetoed. This action is held to take place in the prefrontal lobe (Libet, 2004). He further claimed that the CMF was non-physical. It does not appear that he evinced a Cartesian dualist approach in that ‘non-physical’ may simply mean ‘inaccessible to empirical means of measurement’ (Lindahl & Arhem, 2019). Hence the CMF is likely to be an affirmation of the distinction between private events and public events and the different ways in which they are accessed, the former through introspection and the latter through external observation (Swinburne, 2013).

Nonetheless, Libet et al’s. (1983) results have been interpreted as a negation of conscious volitional control altogether, making motivational theories that rely on autonomous volition, effectively obsolete. Free will from a strictly indeterminist perspective is not explicitly ruled out however a construal of free will that goes beyond ‘chance’ and ‘randomness’, as argued for above, is defeated by entailment. Keller and Heckhausen (1990) and Matsushashi and Hallet, (2008) were able to replicate these findings, strengthening the case for an epiphenomenalist position on free will. The argument for this case, represented in *Modus Ponens* form, let ‘R’ represent the epiphenomenalist stance; namely, the conjunction of the two propositions; ‘there is always a uni-directional time-gap between *RP* and intention formation such that ‘R’ always precedes intention formation’ and ‘*RP* is a precursor for all motor action’. Let ‘T’ be the proposition that ‘every antecedent physical cause is a sufficient condition for its causal consequent’ also known as necessary causation. And let ‘F’ represent the claim ‘agents have free will’ as defined as ‘conscious volitional control’. Note that ‘F’ may be construed as another popular libertarian definition of free will expounded by Kane (1998) ‘agents are *causally powerful*.’ Thus, the epiphenomenalist’s evidential argument will proceed as follows:

(1)  $RT \rightarrow \sim F$

(2) RT

(3)  $\therefore \sim F$

The conclusion is valid, that is,  $\sim F$  properly follows from premises (1) and (2). However, the argument is unsound as T in (2) can be shown to be false and R in (2) is dubious. Firstly R (2) is uncertain as questions have arisen regarding the research validity of the study conducted by Libet et al. (1982). Firstly Mele and William (2009) and Danquah, Farrell and O'Boyle (2008) have shown that setting accurate parameters for W time is problematic. The latter finding that clock speed and stimulus modality created reporting bias (Danquah, Farrell and O'Boyle, 2008; Clarke, 2015). Furthermore, Matsushashi and Hallet's (2008) replication used a systematic analysis that influenced the W times to progress to later times and RP onset times to be relegated to earlier times (Jeeves, 2013). The same study also included large variation between onset of RP and reported W time such that W time preceded or had a dubious relationship to RP for 5 out of the 15 participants. Jeeves (2013) described this as '...a worryingly large proportion' (p. 56). Trevena and Miller (2002) also found that lateralised readiness potential (LRP), which is a more specific manifestation of RP, demarcating between left and right hand movements (Maoz, Mudrik, Rivlin, Ross, Mamelak and Yaffe, 2015), potentially occurs after W time as opposed to before. These findings were extended with confirmation that RP and LRP occurring post W time are not significantly different from those preceding W time (Trevena and Miller, 2010). Miller, Shepherdson and Trevena (2011) also found strong evidence to conclude that the RP measured in Libet et al.'s (1983) study was an artefact of clock monitoring. Adding to the interpretation that RP is not a necessary antecedent to decision making, Schurger, Sitt and Dehaene (2012) found that using a stochastic model to analyse a Libet-style experiment devoid of temporal cues eliminated the



appearance of a threshold crossing RP. Rather, spontaneous neural fluctuations accounted for the decision-making process in absence of time-locking intention formation (Lavazza, 2016). Schurger, Mylopoulos and Rosenthal (2016) thus interpreted the RP as neuronal noise resultant from many variables (Lavazza, 2016). Maoz et al. (2015) have extensively documented criticisms of the original study which led them to conclude that ‘...there appears to be no clear-cut evidence that either RP or LRP are neural markers of intention onset, or that they are part of the causal chain leading to intention...’ (p.186). Advances in technology do not seem to lend weight to the conclusion proclaimed by Libet et al. (1983) either. A study appearing in *Nature Neuroscience* utilised functional magnetic resonance imaging (fMRI) with the implementation of Libet-style conditions and claimed that 10 seconds prior to awareness, the brain has encoded action decisions in the prefrontal and parietal cortex (Soon, Brass, Heinze and Haynes, 2008). This claim appeared in the summary and vastly exaggerated the findings in the paper itself which found a correlation between prefrontal and parietal cortex activity and decision to act with 60% predictive power (Clarke, 2015). Note that fMRI scans operate by detecting alterations in blood flow to regions in the brain (Tallis, 2016). In order for detection to be effective, the blood flow alteration must be sufficient to activate large numbers of neurons and detection can lag from 2-10 seconds (Tallis, 2016). Given these limitations, it is entirely possible that the fMRI scan is blind to the actual brain functions relevant to the phenomena being measured (Tallis, 2016) casting further doubt on Soon et al.’s (2008) conclusions and the validity of the first conjunctive R in (2).

The second conjunctive T in (2) is also unsound. This is due to Hume’s (1748/2012) observation that necessary causation is not directly observable through the scientific method, rather it is inferred post observation. Arguments against this position date back as far as Hume’s (1748/2012) *An Enquiry Concerning Human Understanding*. In this seminal work on

the philosophy of science, Hume (1748/2012) demonstrates that cause and effect must be known by experience not *a priori* argument; ‘This proposition, *that causes and effects, are discoverable, not by reason but by experience*, will readily be admitted...’ (4.24, p.594). Due to this fact, cause and effect must be based on observation utilising sense perception. External observations however, reveal only random series of events. There is no event that occurs externally that *by itself* demonstrates necessary causation rather ‘...this connexion, therefore which we *feel* in the mind... is the sentiment or impression from which we form the idea of power or necessary connexion. Nothing farther is in the case’ (7.59, p.632). The connection is therefore in the mind not in nature, and ergo is not a scientific observation. ‘When we say, therefore, that one object is connected with another, we mean only that they have acquired a connexion in our thought...’ (7.59, p.632). Now some philosophers have argued that the denial of necessary causation is impractical, and evaporates as a lived reality outside of philosophical theorising (Flew, 2007; Lennox, 2009). This does not pose a defeater for Hume’s (1748/2012) argument however, as majority belief or action cannot entail the falsity of any theory (Sagan, 2007). The fact that the majority of individuals believe and perceive themselves to act in accordance with autonomous free will (Roskies, 2006), does not imply that determinism is therefore false. A more promising defeater for the Humean position may come from arguments from the success of science. Though observations cannot directly demonstrate necessary causation, nonetheless scientific theories that assume necessary causation have been extremely successful lending weight to the underlying truth of such an inference. Thus, the following argument will be used;

- (1) The theories in the advanced or mature sciences are successful.
- (2) A theory whose central terms genuinely refer will be a successful theory.
- (3) If a theory is successful, we can reasonably infer that its central terms genuinely refer.

(4) All the central terms in the theories in the mature sciences do refer.

(Laudan, 1981, p.23).

Thus, if the scientific theories which utilise the concept of causation as connectives, are successful, they genuinely refer to the way in which the material world truly is. And if they refer to the way that the material world is, then they are true, including the causal connectives, even though those are not directly observable. Laudan (1981) however shows that this argument is unsound. Particularly (2) and (3) are false. Regarding (2), there are multiple instantiations of theories that are considered referential in the contemporary sciences, that nonetheless were either seemingly refuted or remarkably unsuccessful initially. Notably, Laudan (1981) cites the chemical atomic theory of the 18<sup>th</sup> Century which was largely deserted due to its dearth of success for elective affinities; atomic theory based on the Proutian interpretation that hydrogen atoms constitute heavy elements, also facing high levels of refutation; and Wegenerian continental drift which was not widely accepted for 30 years in the geological sciences. (3) faces similar counterexamples. In particular aetherial theories that purportedly explained field attraction when charges are oppositional and caloric theories of heat which accounted for heat conduction and radiation (Laudan, 1981). In light of these counterexample, the defender of causation may make the more conservative argument;

(T1) If a theory is approximately true, then it will be explanatorily successful; and

(T2) If a theory is explanatorily successful, then it is probably approximately true.

(Laudan, 1981, p. 30).

Defining approximate truth or verisimilitude however has proved difficult (Laudan, 1981).

The most reasonable definition, that a theory  $T_1$  is true if its correspondence with truth

outweighs its non-correspondence with truth, construed as  $C_{tT}(T_1) \gg C_{tF}(T_1)$  where  $C_{tT}(T_1)$  is the cardinality of truth corresponding sentences in the set for  $T_1$  and  $C_{tF}(T_1)$  is the cardinality of non-corresponding sentences in the set for  $T_2$ . Verisimilitude defined in this fashion however, does not affirm the antecedent in T1. Given the probability involved, it is logically possible that no true entailment is observed in any approximately true theory. Thus, the success of scientific theories cannot be used as a coherent defence of causation. Indeed Hicks (2011) notes that no coherent theory of causation has been reached in the sciences.

This is not to argue for an anti-realist position regarding science as a whole. It is acknowledged that the scientific method has been instrumental in the progress of knowledge and technology within the Western world. Nonetheless the formation of a deductively valid *a priori* argument against free will using necessary causation as a predicate cannot be shown to be sound. Specifically, the conjunction RT in premise (2) cannot be said to be coherent. Experimental evidence and current interpretations of RP and LRP do not favour interpretation R. T cannot be asserted as true given the defeaters facing arguments for necessary causation. This is not to say that, agential free will is true; rather the current arguments in favour of its antithesis, determinism, are not convincing. Therefore, belief in agential free will is not unwarranted, and psychological theories requiring motivation as a driver such as goal-theory and self-regulation are not defeated by current determinist objections. As a caveat, there may be other forms of determinism that are not susceptible to the above criticism, and which do not, in themselves, constitute defeaters for belief in the psychological theories of motivation. The above applies only to the epiphenomenalist about content properties or the reductive materialist about brain function.

## Folk conceptions of free will

Folk conceptions of free will are of particular importance to experimental researchers as they provide insight into the conceptual presuppositions of the participants involved in their studies. This area is also of salience for research in psychometric psychology, where scales are developed to measure various phenomena including belief in free will (Paulhus & Margesson, 1994; Rakos, Laurene, Skala & Slane, 2008; Paulhus & Carey, 2011; Deery, Davis & Carey, 2014; Nadelhoffer, Shepard, Nahmias, Sripada & Ross, 2014). Furthermore, experimental studies analysing belief in free will and behaviour often utilise belief manipulation as a way of making causal inferences regarding variables (Vohs & Schooler, 2008; Genschow, Rigoni & Brass, 2017; Mackenzie, Vohs & Baumeister, 2014; Rigoni, Kuhn, Sartori & Brass, 2011; Alquist, Ainsworth, Baumeister, Daly & Stillman, 2015; Rigoni et al., 2013; Rigoni, Kuhn, Gaudino, Sartori & Brass, 2012; Rigoni, Pourtois & Brass, 2015; Shariff et al., 2014; Baumeister, Masicampo & DeWall, 2008; Feldman, Baumeister, & Wong, 2014; Alquist, Ainsworth & Baumeister, 2013; Crescioni, Baumeister, Ainsworth, Ent & Lambert, 2016).

Due to the plethora of research that relies on manipulating belief in free will, it is important to ascertain what laypersons believe free will to be. There are now multiple studies in this area that strive to elucidate folk conceptual structures of free will (Nahmias, Morris, Nadelhoffer, & Turner, 2005; Monroe & Malle, 2005; Monroe, Dillon & Malle, 2014; Feldman & Chandrashekar, 2018). This is an interesting development as the traditional domain for free will has been philosophy, which, in its experimental form, has now begun utilising procedures from psychology in order to illuminate relevant theories (Nahmias et al., 2005). Uniformity amongst theorists is the criterion specified by Nahmias et al. (2005) to determine whether a theory requires research into folk intuitions and it is a criterion that free will is notably lacking. In fact, it is not uncommon for philosophers to claim their position on the

topic best represents the folk perception (Nahmias et al., 2005). Given the variance of positions on the topics discussed above, it is not surprising then, that contradictory claims regarding the beliefs of laypersons have become entrenched in some areas of the academy. Nahmias et al., (2005) identify *theory-ladenness* as a major reason whereby, philosophers extrapolate their own view, which has been shaped and informed largely by a particular theory, onto the general population. With this as the motivator behind their research, Nahmias et al., (2005) conducted a seminal study, using responses to hypothetical scenarios, to determine folk conceptions of free will. Specifically, their main aim was to elucidate the conceptual structure laypersons hold regarding compatibilism and incompatibilism. It should be noted that the study avoided potentially confounding terms such as ‘determinism’ that may have had a proscriptive effect on respondents. The findings suggested that the majority of individuals hold compatibilist intuitions. The margin was not overwhelming, and a significant number of individuals indicated an incompatibilist interpretation. This led Nahmias et al. (2005) to suggest that individuals either have contradictory beliefs regarding free will, or there is substantial variance within the general population with maintenance of conceptual consistency.

The authors were transparent regarding limitations, particularly by claiming that determinism may not have been construed adequately in order that respondents’ answers were truly indicative of lay intuitions. Nonetheless they failed to take into account reductive biological accounts of determinism that are prevalent in the sciences, particularly neuroscience (Tallis 2016). This limitation becomes increasingly salient when the plethora of studies effectively priming subjects with a biological account of determinism which produces the effect of lowering belief in free will. (Schooler & Vohs, 2008; Genschow, Rigoni & Brass, 2017; Mackenzie, Vohs & Baumeister, 2014; Rigoni, et al., 2011; Alquist, Ainsworth, Baumeister, Daly & Stillman, 2015; Rigoni et al., 2013; Rigoni et al., 2012; Rigoni, Pourtois & Brass,

2015; Shariff et al., 2014; Baumeister, Masicampo & DeWall, 2008; Feldman, Baumeister, & Wong, 2014; Alquist, Ainsworth & Baumeister, 2013; Crescioni, et al., 2016). Clearly this should not be the case if the majority of participants are compatibilists who, in turn, have no difficulty in reconciling determinism with free action. A response may be that the participants in those studies were not necessarily screened for theoretical training in philosophy as was done in the Nahmias et al. (2005) study. Nonetheless, the consistency of this result in experimental psychology casts some doubt on the effectiveness of the construal of determinism in their research.

The focus of Nahmias et al.'s. (2005) research was to delineate folk conceptions regarding compatibilism and incompatibilism. This study however misses the more general consideration of what laypersons conceive the essence of free will to be. This question was addressed in a study Monroe and Malle (2009) conducted where participants were simply asked to record their understanding of what is meant by the term 'free will'. The findings indicated that participants viewed free will as 'making a choice, following one's desires, or being free of constraints' (p.215). Monroe and Malle (2009) concluded that folk conceptions could be labelled as 'free choice'. This construal is analogous to the Ancient Greek conception of free will as 'choice' as opposed to the Augustinian model of the will as an independent faculty of the Soul (Cary, 2007).

It is important to note that the conclusions of any study on folk intuitions, are irrelevant to the ontological debate pertaining to free will. Although, Nahmias et al. (2005) acknowledge this fact, they claim 'if a philosophical theory *does* turn out to be privileged by the endorsement of the folk, that would seem to position the burden of proof on the shoulders of those who argue *contrary* to folk intuitions' (p.564). This line of argument is fallacious as it appeals to consensus (Sagan, 2007). Just as the majority of the lay population assumed the Aristotelian view, that the earth was the centre of the universe before and even for a time after Copernican

heliocentrism (Dear, 2001), so appealing to a majority to identify their common conception says nothing about the ontological truth sought by philosophers to resolve the debate.

Regardless, research by Sarkissian, et al. (2010) indicated that the majority of students harbor belief in a universe where free will is possible. They broadened the scope of their research and sought to determine whether such a belief was endemic only to Western settings. Their study thus incorporated students from diverse locations and cultures, namely, the United States, Hong Kong, India and Colombia. Results found that the majority of students > 65% indicated that they believed that the universe was indeterministic, whilst the majority > 63% indicated that they believed determinism to be incompatible with moral responsibility.

Perhaps not surprisingly, students from the United States scored highest on both measures (82% and 75% respectively) while students from Hong Kong scored lowest (65% and 63% respectively). This may be a product of the differing political systems influencing culture.

The United States constitution in one case with an emphasis on limited government and maximal freedom and the Chinese Government's influence on Hong Kong with a contrasting emphasis on Socialist totalitarianism (Chen, Chin & Liu, 2018; Freedom House, 2019; Hesketh & Zhu, 2004; Qianfan & Yingping, 2011).

The question as to why belief in free will is so pervasive was the subject of a study conducted by Aarts and Van den Bos, (2011). They sought to analyse the mechanisms by which belief in free will is internalised and strengthened. They found two important factors in fortifying self-agency namely, *intentional binding* and *unconscious priming*. Regarding the former, they conducted an experiment similar to Libet et al.'s (1983) clock monitoring task, where participants were separated into four conditions. Two conditions required participants to monitor a clock and then press a key which caused a sound to be played 250ms afterwards. Participants were to judge onset of key press in the first trial and onset of tone in the second trial. Note the difference between Libet et al.'s. (1983) experiment where participants were



asked to monitor onset of *intention*, a much more obscure request when compared with the present experimenters' request to judge onset of action itself. Furthermore, action can be cross-checked as it is known to the experimenter whereas intention is not. The latter two conditions simply recorded reported onset of key press without tone and onset of tone without key press, as a reference. The results of this experiment revealed that subjects in the first two conditions bound the action and effect together in time when compared with the reports from the referential conditions. Furthermore, this effect was stronger for those who ranked higher in belief in free will. Aarts and Van den Bos (2011) then conducted a computer based priming task, where participants monitored and stopped a moving square. In half of the trials, the participant was primed regarding the location of the stopping point before they were instructed to stop the square on screen. The priming was effective in increasing self-agency scores for participants who ranked highly in free will. Both of these results are instrumental in understanding how self – agency is reinforced throughout the social environment. Intentions that lead to expected results, whether they were freely acted out or not, bind the time-distance between intention and effect, thus strengthening the free will perception (Aarts & Van den Bos, 2012). Similarly, unconscious primes that encourage certain behaviours are linked to supposedly spontaneous intentions that further fortify the perception of self-agency.

### Belief in free will and driver behaviour

Studying the way in which belief in free will affects behaviour is a recent trend in psychology beginning with Vohs and Schooler's (2008) seminal article linking belief in free will to negative social behaviour. Vohs and Schooler (2008) hypothesised that reducing belief in free will would increase the cheating frequency in two test conditions. The first experiment measured passive cheating, whereby participants were informed they had to press a button on

a keyboard in order to prevent the correct answers on a test from being displayed. The second experiment measured active cheating where the experimenter left the test room, and instructed participants to score their own answers. In both experiments, the no-free will condition exhibited increased cheating behaviour over the control condition. A notable limitation acknowledged by Vohs and Schooler (2008) is the fact that the individual scores for the cheating condition were not collected, as shredding of paper post-test was essential to maintain anonymity (a potential confound for cheating measurements). Therefore, there is a non-zero probability that the average increase of cheating was due to the actions of one or two participants rather than the group as a whole. Regardless, the results indicated that there is a link between reduced belief in free will and cheating. The fact that this study focused on cheating, which has a moral dimension, makes it specifically relevant to driver behaviour. This is due to the fact that negative driver behaviour (as measured in the present study) often has a moral dimension as well. For instance speeding or driving under the influence of alcohol, like cheating, are considered violations of moral norms.

Belief in free will was also linked to self-control by Rigoni et al. (2012) in an experiment that sought to determine whether the weakening effects of manipulation was due to degradation of perceived self-control. In an initial experiment, it was found that participants in the no-free will condition were less likely to inhibit a prepotent response to stimuli displayed on a computer monitor. Rigoni, et al. (2013) expanded this research on self-control, focusing on cognitive reaction to errors. The findings revealed that reduced belief in free will slowed performance and error monitoring processes that produce feedback. This is an important finding regarding the present research as driver behaviour, specifically monitoring speed limits, requires inhibition and error monitoring. This is of particular salience when there is a speed zone change. Intentional inhibition was in this case measured at a micro level, with contrived circumstances in Rigoni et al's., (2012) research. If free will belief depletion results

in lowered intentional inhibition, these effects may spill out into macro behaviours like driving.

It should be acknowledged that some positive behaviours have been associated with a lower belief in free will, in particular the exhibition of a less punitive attitude (Brewer & Austin, 2016). However, as can be seen from the research reviewed, multiple scenarios have been tested and one major trend appears across the various studies; depleting belief in free will leads to negative social behaviours.

Furthermore, research on driver behaviour has shown that conformity is a major factor in speeding behaviour. Møller and Haustein (2014) found that the greatest predictor of peer speeding was perception of peer speeding. In particular ‘young male drivers are socialised into increased speeding based on peer pressure’ (p. 96). Duong and Parker (2018) found that this applied to misperceptions in their study on motorcyclists. In particular they found a correlation between bias in perceived speeding norms and self – reported speeding behaviour applicable to both male and female motorcyclists. This relates strongly to research by Alquist, Ainsworth and Baumeister (2013) who were able to demonstrate that conforming behaviour is predicted by disbelief in free will. They did this by conducting three studies. The first study was correlational in nature and required participants to complete a conformity scale and rank their belief in free will on a free will scale. The results indicated a negative correlation between belief in free will and conformity. The second study was an experimental design that required participants to critique various artworks. Conformity was measured by agreement with previous responses which were visible to participants. Results indicated that those in the experimental condition, who had been exposed to anti-free will manipulation, were more likely to conform to previous responses. The final experiment sought to exclude ‘threats to world-view’ as a possible confound explaining increased conformity. Participants were asked to create novel names for three categories of product and conformity was

measured by deviance from provided examples. Participants in the manipulation condition displayed more conforming behaviour than the control and world-view threatening conditions. This is strong evidence to support the notion that belief in free will is associated with conformity. Taken with the above studies on driver behaviour, decreasing belief in free will may increase conformity which in turn increases speeding behaviour. Thus, conformity may act as a mediating variable augmenting the effect of anti-free will manipulation.

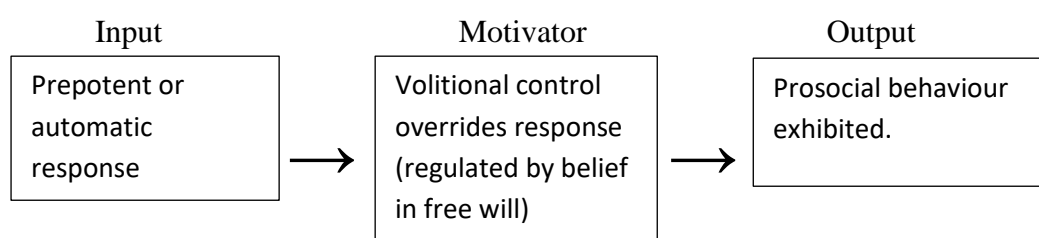
### Explaining Manipulation Effects

Within the majority of research studies there are two variants of manipulation techniques aimed at challenging free will. Firstly, an anti-free will excerpt from a book written by Francis Crick (1994) and secondly utilising a Velten (1968) like procedure where respondents read and re-write statements that are either pro-free will, anti-free will or neutral. Both of these have been extracted from Vohs and Schooler's (2008) study which showed these methods to be effective in belief manipulation. The question then arises, why does this occur? Various studies have considered this in the scope of their research on free will and behaviour. Schooler, Nadelhoffer, Nahmias and Vohs, (2014) were aware of the previous findings in the literature on the negative consequences of free will belief manipulation and sought to find a reason behind the observed effects.

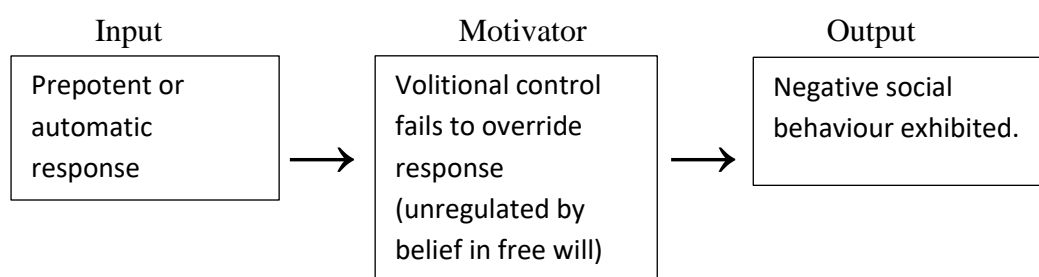
Concerning their research, Rigoni et al., (2012) hypothesized that free will may play the role of a motivator in intentionally controlling behaviour. Once that notion is damaged by manipulation, effortful actions that inhibit prepotent responses may be dropped. Baumeister, Masicampo and DeWall (2009) sought to further these findings by introducing the concept of volitional control as the mechanism by which automatic responses can be overridden. In their study they confirmed that manipulation effects were not an artefact by finding a correlation between chronic disbelief in free will and unhelpfulness. They were also able to dispel a

competing hypothesis, namely that negative behaviour was due to increased passivity and indolence. However, their finding that aggression also increased due to belief depletion casts some doubt on the above account due to the energy cost aggression demands compared to non-aggression. Alquist, Ainsworth and Baumeister's (2013) study was predicated on this principle. They hypothesized that reduced belief in free will would be a predictor of conformity. This is due to the fact that nonconformity requires effort. They listed three reasons. Firstly, effort must be invoked to intentionally repel social influences. Secondly, opinion expression requires decisional consideration and enactment, which is an effortful process. Finally, explanation might be required from nonconformists, a task not usually requisite for majority agreement. Three studies, one correlational and two experimental confirmed this. In every scenario those with reduced belief in free will were more likely to conform to group behaviour. Thus, the model that displays the functionality of belief in free, and currently has the most empirical support can be construed as follows;

#### Pre – manipulation



#### Post – manipulation



It is important to note that Schooler et al. (2015) conducted multiple experiments on the ego-depletion account of belief in free will, whereby the cause of prime effectiveness is considered due to motivation weakness. This is in contrast to an exoneration account where the primes grant an excuse to misbehave. The added moral component in this view makes it less preferable as an *a priori* explanation according to Occam's razor. The experiments were not able to convincingly demonstrate that ego – depletion was the main cause. In fact they were unable to replicate the finding reported by Baumeister, Masicampo and DeWall (2009) that weakening belief in free will decreased helpfulness. Although it was not a direct replication, this is still seemingly contradictory. One likely explanation for these results comes from the fact that an alternative manipulation was used by Schooler et al. (2015), compared with the Crick (1994) and Velten (1968) style primes used in the bulk of experimental studies as listed prior. This was verified in a further study conducted by Schooler et al. (2015) in which it was found that the Crick (1994) prime in particular yielded a greater score on the determinism section of the FAD-Plus Scale (Paulhus & Carey, 2011) than the trial primes used in the ego-depletion experiments. Although the results of these experiments must be taken seriously, it may be that a deficiency in manipulation power can account for the disparity in findings. Further research into the causal nature of anti-free will manipulations is needed.

### Rationale

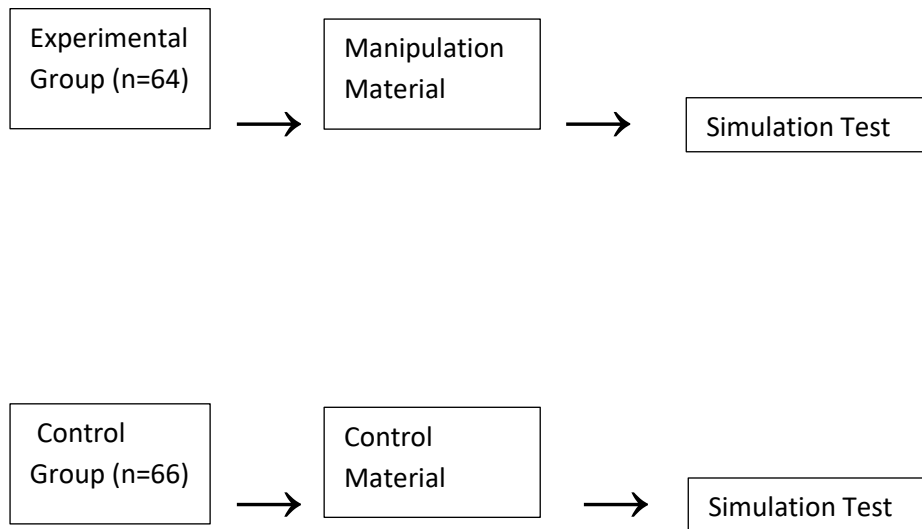
The aim of the current research was to investigate the relationship between beliefs in 'free will' and driver behaviour. The operating driving question was narrowly focused on whether lowering beliefs in 'free will' would lead to increased negative driver behaviour in the form of speeding. One experiment was constructed in order to test this.

## Experiment Design

The aim of the experiment was to ascertain whether lowering belief in ‘free will’ negatively affects driver behaviour. It was hypothesised that challenging belief in ‘free will’ would increase negative driver behaviour in the form of speeding. The hypothesis was strengthened by the finding made by Rigoni et al. (2013) that lowering belief in ‘free will’ reduced intentional inhibition and perceived self - control, a process arguably important for monitoring driving behaviour (also see Rigoni et al. (2012)).

Given that speeding is the leading contributing behavioural factor to deaths on the road in New South Wales (Centre for Road Safety, 2019). This study was considered potentially important for road safety. If the null hypothesis was rejected, then a causal factor in a behaviour that may lead to deaths on the road would be identified, and strategies to overcome this and increase road safety could then be postulated and trialled. Secondly, if the null hypothesis was accepted, then it would seem that belief in ‘free will’ is not a contributing factor to speeding and therefore can potentially be ruled out in the search for strategies to reduce speeding behaviour on roads.

## Experimental Design



## Method

A power analysis conducted using *G\*Power 3.1* indicated that 128 participants were necessary assuming a medium effect size. The experiment was broken into two phases. The first phase followed Vohs and Schooler's (2008) method of manipulating belief in 'free will'. Participants were given an excerpt from Francis Crick's (1994) book *The Astonishing Hypothesis*. His credentials were clearly visible increasing the persuasive authority of the author. In the manipulation condition, the participants are provided with an excerpt that claims 'free will' is an illusion. In the control phase for both conditions, participants were exposed to an excerpt on human consciousness that does not comment on the reality of free will. This method of altering belief in free will has been successfully utilised in multiple studies and a meta-analysis conducted by Genschow, Rigoni and Brass (2017) which included nine studies, indicated 'that the anti-free-will text significantly lowered the belief in free will compared with the neutral text' (see supporting information p.5). Despite the effectiveness of the anti-free will message, Monroe and Malle (2009) found that, when asked



to respond to the statement that neuroscientists reject free will as illusory, only 26% accepted the claim. The majority, 49% rejected the claim and a further 25% were ambivalent. This seeming contradiction with the effectiveness of belief manipulation, particularly the Francis Crick (1994) excerpt may indicate that the prime is accepted unconsciously. It should also be noted that there are differences in the way the materials are presented to participants. For instance, Monroe and Malle's (2009) study used an excerpt that stated that 'Neuroscientists *claimed...*' (emphasis added) that free will was an illusion and requested participants state whether they agreed (p. 217). Whereas the Francis Crick (1994) prime is a statement of 'fact' with no opportunity for dissent. His credentials clearly labelled on the material give additional support to this claim ergo, the nature of the claim might be perceived more forcefully.

## **Participants**

Overall, 146 participants were tested. Due to simulation sickness and simulator malfunction, this was reduced to 131. One outlier was excluded as the participant was recorded travelling 145 kph kilometres per hour (kph) in the 60 kph zone. Given that NSW law dictates an immediate licence suspension and possible impoundment of vehicle if caught travelling at 45 kph over the speed limit, this was not considered a serious attempt.

## **Procedure**

Following from Rigoni, et al., (2011) participants were informed that they would be given a comprehension test on the information in the excerpts. This measure was enacted to ensure participants engaged with the material. All participants (N=130) were requested to complete

the Free Will and Determinism-Plus Scale (Paulhus & Carey, 2011) to test the effectiveness of the manipulation post experiment.

An anti-free will manipulation was chosen due to the difficulty in achieving behavioural departures from the control baseline when participants are exposed to pro-free will primes (Baumeister & Brewer, 2012). Alquist, et al. (2015) have challenged this with a study that found pro-free will manipulation to positively affect production of counterfactuals (note that effect size was not large,  $r = .23$ ). Nonetheless, due to such discrepancies, this study utilised anti-free will manipulation.

The second phase of the experiment involved participants engaging with a test on a driving simulator. This is a fixed base replication of a right-hand drive vehicle which includes the following features; brake and acceleration pedals, seatbelt, six speed automatic transmission, handbrake, driver's seat, steering wheel, speedometer, tachometer and operational signal lights. UC-win/Road (Forum8 Co Ltd) software was used to run the simulation. The visual set up consisted of three 42-inch flat LCD screens which enabled a 135-degree view at 180 cm from the cab. The simulation spanned across 5 speed zones, 100, 60, 50, 40, 50 and extended for a distance of approximately 4.5 kilometres. The test drive alternated between urban and rural environments. Police presence was not included to avoid confounds such as perception of surveillance. Speeds were recorded across all segments of the test drive. A simulator was deemed the most appropriate tool for this study as previous research (Plant, Irwin and Chekaluk, 2017) had demonstrated its superior ecological validity compared to intention measures. For instance, participants in Plant, Irwin and Chekaluk's (2017) study were shown two commercials, one depicting social consequences, and the other physical consequences in the form of a car accident. Although self-report measures indicated that the latter commercial was more effective as a speeding deterrent, data on driving behaviour

captured on the simulator revealed the commercial portraying social consequences had a higher correlation with reduction in speeding behaviour.

Participants were asked to complete a test drive prior to the recorded test to ensure they were familiar with the system. The test simulation did not overlap in content with the practice simulation in order to minimise learning effects. Prior to the test simulated driving test, participants were shown the features of the simulator as necessary for operation, including the gear selector, the handbrake, and the speedometer. Participants were then instructed to drive as they would their normal vehicle on a weekday at 3 pm.

Two types of data were collected from each participant, namely average speed, and highest speed, both recorded by the simulator in kilometres per hour. Only the data from the second zone (60 kph) was used. This was deemed the most accurate recording point by the researcher as the zone spanned over a reasonable distance (880 metres). Furthermore, the entry point to this zone required an acceleration from a stop sign (0 kph) ensuring that highest scores did not include braking from a faster speed zone immediately prior. The exit point required braking to a slower speed and subsequent red light, ensuring that highest speed scores did not capture increased speed into a higher speed zone. Furthermore, this zone did not include any hazards in order to minimise confounds.

At the end of each experiment, a manipulation check was included. Respondents were then tested using the Free Will and Determinism Plus scale (Paulhus & Carey, 2011) to assess whether the prime was effective. This was situated post-task to reduce participant awareness of manipulation.

One salient ethical concern was the fact that previous research has demonstrated the negative social effects of belief in free will, and these will potentially be transferred to the participants. To address these concerns, a debrief/re-consent form was disseminated at the conclusion of the experiment which informed the participant of the nature of the study, and the purpose of the article which they were exposed to. Having been made aware of this, participants were required to sign the form if they wanted their data to be included in the study. They were able to withdraw from the study at any point with no penalty. They were also provided with contact numbers for psychological assistance in case of distress induced by the study.

Measures for mood, arousal, personality traits and social desirability were not included as previous research has indicated that there is no significant interaction with belief in free will, nor are they affected by anti-free will primes (Baumeister et al., 2009; Rigoni et al., 2012).

## Results

The data did not meet the normality assumption for an ANCOVA. Data trimming was untenable as normality was only met after the sample size was significantly reduced in power, raising the risk of committing a Type II error. Log transformation and square root transformation failed to produce linearity. Therefore, the sample ( $N=130$ ) was divided on the main factor (belief in free will) creating two groups, namely *control* ( $n = 66$ ) and *manipulation* ( $n = 64$ ). The means were compared using methods that allowed for non-parametric input (bootstrapping for parametric tests). The alpha threshold was set at .05. The first test revealed that the reduced belief in the free will group ( $M = 53.90$ ,  $SE = 1.06$ ) did not differ significantly on average speed when compared with a control group ( $M = 53.07$ ,  $SE = 1.07$ ),  $t(128) = .550$ ,  $p = .586$ ,  $d = .09$ . The second test also elicited a non-significant result when the manipulation group ( $M = 69.20$ ,  $SE = 1.38$ ) was compared with the control group

( $M = 68.95$ ,  $SE = 1.36$ ), on highest speed reached  $t(128) = .126$ ,  $p = .899$ ,  $d = .02$ . Non-parametric testing confirmed the finding for the manipulation ( $Mdn = 53.71$ ) and control ( $Mdn = 52.97$ ) on average speed ( $U = 2214$ ,  $ns$ ); and manipulation ( $Mdn = 67.23$ ) and control ( $Mdn = 68.86$ ) on highest speed reached ( $U = 2045$ ,  $ns$ ). Data collected on random factors included *age* ( $M = 21.18$ ), *gender* which was divided into three levels, male ( $n = 35$ ), female ( $n = 94$ ) and non – binary ( $n = 1$ ); level of *licence* which was divided into three categories provisional 1 ( $n = 30$ ), provisional 2 ( $n = 69$ ) and full licence ( $n = 31$ ); adherence to *religion* which was divided into two categories, religious ( $n = 66$ ) and non – religious ( $n = 64$ ); and speeding *infringements* which was broken into two groups, speeding infringement in last 12 months ( $n = 15$ ), no speeding infringement in the last 12 months ( $n = 115$ ). Due to the fact that no significant effect was detected, and effect sizes were small, analyses taking these variables into account were not conducted.

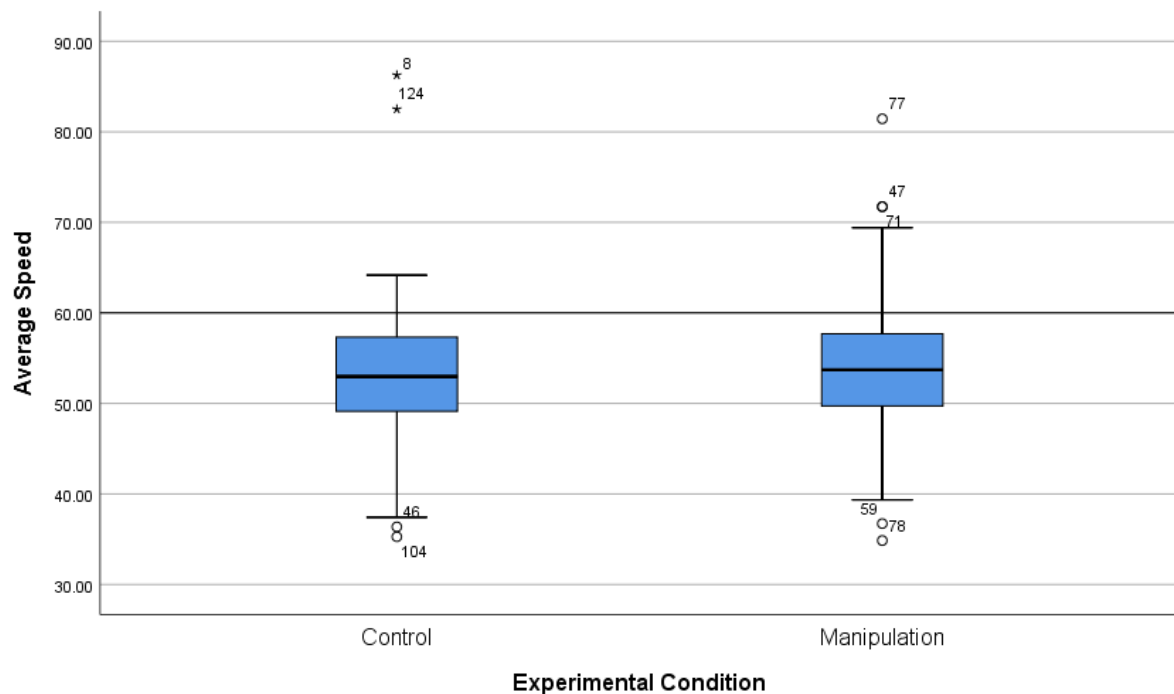
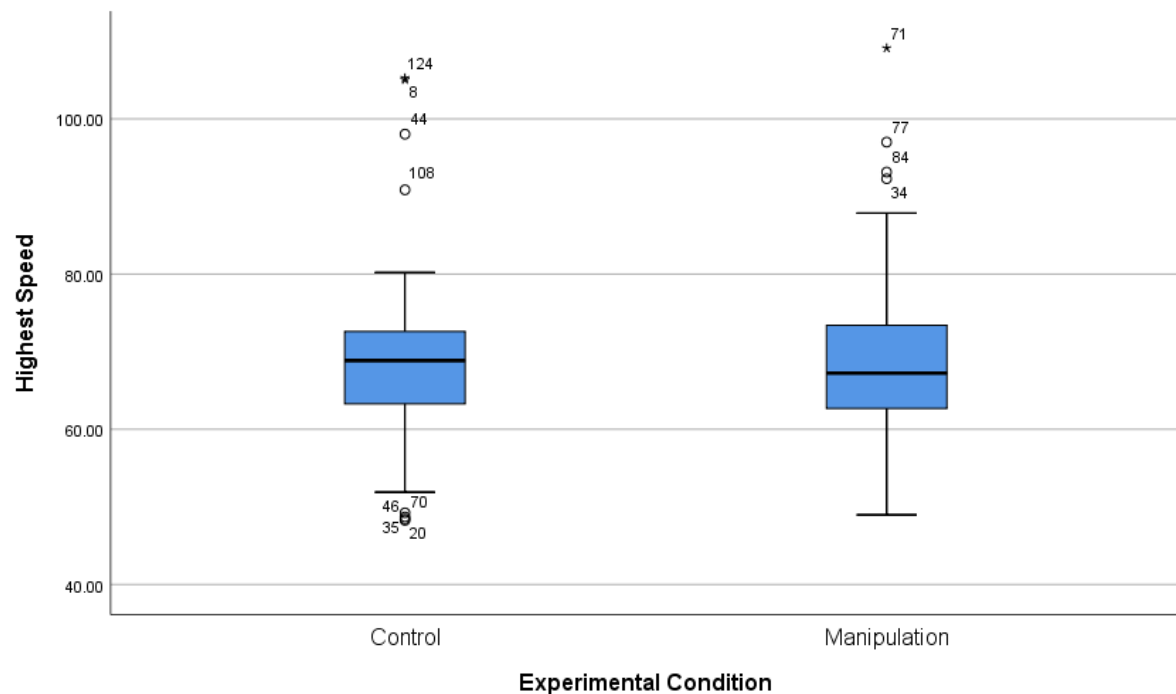


Figure 1

Results for the control and manipulation conditions on average speed.



*Figure 2*

Results for the control and manipulation conditions on highest speed.

Figure 1 and Figure 2 illustrate the large number of outlier scores spread across the median in both directions. As can be seen in Figure 2, when highest speed was measured, the manipulation did not have any significant outliers below the median, contrary to the manipulation measuring average speed (Figure 1). However, the variance between control and manipulation on highest speed was not significantly different  $F(1, 128) = .074, p = .786$ .

## Discussion

The results did not indicate that reducing belief in free will negatively affects driver behaviour as measured by speeding. Although this study was not a direct replication of any previous study on belief in free will, it may be regarded as a conceptual replication. This is because the independent variable was operationalized in the same way as that of Vohs and Schooler's (2008) and others (see Genschow, Rigoni & Brass, 2017 for review) yet the dependent measure was altered in a way that extended from previous findings on self-control (Rigoni, Kuhn, Sartori & Brass, 2012). Thus, the failure to reproduce previous findings may be read as a limitation on the generalizability of prime efficacy. In particular, the validity of studies that include similar mediating variables such as morality (Vohs and Schooler, 2008) or self – control (Rigoni, Kuhn, Gaudino, Sartori & Brass, 2012) may be questioned.

This is augmented in light of the 'replication crisis' purportedly pervading psychology (Pashler & Wagenmakers, 2012; Stroebe & Strack, 2014). In specific relation to research on belief in free will, Vohs and Schooler's (2008) seminal paper with over 341 citations in 2015 (Carey & Roston, 2015) failed a replication attempt by Embley, Johnson and Giner-Sorolla (2015). The reproduction only attempted to replicate Study 1. Initially, Vohs and Schooler (2008) had found that the Free Will subscale scores on the Free Will and Determinism scale (FWD; Paulhus & Margesson, 1994) were affected by condition,  $t(28) = 3.28, p < .01$ , that cheating behaviour (as measured by suppression of correct answers on a computer-based arithmetic test) was increased in the manipulation condition  $t(28) = 3.04, p < .01$ , and that the level of belief in free will predicted the level of cheating  $F(1, 27) = 7.81, p < .01$ . None of these three findings achieved significance at a .05 alpha level in Embley, Johnson and Giner-Sorolla's (2015) study. The effect size was also conventionally small compared with that of Vohs and Schooler's (2008) conventionally large ES, a statistic which Francis (2012)

argues is a superior measure for the replication success. Zwaan (2013) reported another failed replication attempt of Vohs and Schooler (2008) in a blog post. Monroe, Brady and Malle (2017) also conducted four studies on the interaction between morality and belief in free will which could be considered conceptual replications and found no relationship. Trager (2013) however, did find a relationship between belief in free will and cheating, notably this study used Velten (1968) statements as the priming method contrary to the Crick (1994) extracts used in Vohs and Schooler's (2008) second experiment. Given that replication has been held as the 'gold standard' in the sciences, (Makel, Plucker & Hegarty, 2012; Jasny, Chin, Chong & Vignieri, 2011) this failure can be seen as not only damaging to the postulated construct, but as invalidating Vohs and Schoolers (2008) original study. This perspective is not confined to the realm of academia. For instance, the *New York Times* cited this failing under the heading 'Three Popular Psychology Studies That Didn't Hold Up' (Carey & Roston, 2015). The implication is clear – Vohs and Schooler's (2008) study is unsound – a conclusion that casts doubt on the validity of other conceptual replications which manipulate belief in free will. This perspective however, misunderstands the fundamental nature of replication, and in particular the underlying variables pertinent to analysing belief in free will.

Although failure to replicate can be indicative of a false effect, the circumstances where this can be deduced are far more stringent than many psychologists and public media outlets realise (Francis, 2012). This is due to the fact that statistical rules of probability stipulate that for any population, some random samples will return a null finding even when the effect is real (Francis 2012). Given that power inputs are often dictated by feasibility, and the conventional minimum for a power analysis is as low as .8, leaving a beta of .2 the percentage likelihood of committing a Type II error is significantly higher than the likelihood of committing a Type I error where alpha is conventionally .05. Therefore, a construct that



can be measured should have a number of failed replications both exact and conceptual (Francis, 2012). In fact, a large number of successful replications absent statistically expected failures, is a sign that null findings are being withheld (known as the file-drawer problem) or that the experiments were not conducted and assessed correctly (Francis, 2012). A further distinctive variable at play between Vohs and Schoolers (2008) study and Embley, Johnson and Giner-Sorolla's (2015) replication was the fact that the original authors were not involved in the replication research team. Makel, Plucker and Hegarty (2012) found that replications were more likely to be successful if the research team included authors from the original study (91.7% vs. 64.6%). They conjectured that this may be due to the suppression of null findings that might be perceived to detract from the overall findings of their study. It may equally be that the original author is better able to implement the exact conditions present in the original scenario and thus effectively operationalise the tested variables, a component that is extremely important in exact replications (Stroebe & Strack, 2013). Thus, replication can be a useful indicator of the ontological status of a construct, such that if failures exist which significantly outweigh successful replications, it is unlikely the construct is legitimate. Alternatively, the way by which it is tested may be unreliable. However, in the case of Vohs and Schooler's (2008) research where two direct attempts failed to replicate one experiment from their paper (Baumeister & Brewer, 2012), there is insufficient evidence to question the validity of the reported effect or its theoretical underpinning. This is precisely what the sceptical scientist would expect to see if the field of research into belief in free will was operating correctly.

Although the above considerations apply to the present study, there are further variables pertinent to the discrepancy between the success of previous studies and the current failure to find an effect relating to driver behaviour. The basis for the current study was an extension of

previous findings revealing that aspects of self – control and cognitive reaction to errors are degraded when belief in free will is reduced (Rigoni, Kuhn, Gaudino, Sartori, & Brass, 2012; Rigoni, Wilquin, Brass & Burle, 2013, respectively). The research on this area was conducted using a computer-based task and required participants to exercise intentional inhibition (see Rigoni, Kuhn, Gaudino, Sartori, & Brass, 2012 & Rigoni, Wilquin, Brass & Burle, 2013 for an overview). Notably, there was no moral component involved in these tasks whereas in the present research, participants were tested on a measure (travelling above the speed limit) that involved breaking the law within the context of the simulation. This moral dimension may have acted as a confound. In this case the present study is more relatable to Vohs and Schooler's (2008) study that also included the breaking of a moral norm (cheating).

Assessing why morality may have acted as a confound in the present study and not in Vohs and Schooler's (2008) involves making the important distinction between the 'hard' sciences and psychological sciences. As stated previously, replication is considered 'final arbiter' in all sciences including psychological science (Francis, 2012). However not all sciences investigate the same phenomena. And here a major demarcation between the 'hard' sciences such and other sciences including some disciplines in psychology becomes evident. As argued above, the 'hard' sciences investigate public events, that is, events that are openly accessible to third-party investigators (Swinburne, 2013). Whereas other sciences including psychological sciences rely on private events, that is, events that are only accessible to the subject under investigation (Swinburne, 2013). In the latter case the researcher is dependent upon the subject for information obtained in the form of self – report measures. Thus, the subject has special access to information which the researcher must rely on, contra a *public event*. A further consequence of this distinction however, is the fact that the 'hard sciences' are universalizable as they generally deal with constants, or natural laws, at least on the macro level. Although Hume (1748/2012) disputed this notion, in application this is how the

‘hard sciences’ operate and as such, scientific progress has been made (although some anti-realists deny this as well, see Laudan (1981) above). Conversely, morality is not a universalizable trait, in the sense that it does not manifest itself consistently across cultures and time (Looijen, 2017; Stroebe & Strack, 2013). Although some core aspects do seem to be innate (Gopnik, 2009), nevertheless there is great variation across and within societal groups (Looijen, 2017). Morality is based on collective moral intuition, stemming from *private events* thus, its study is not in the category of ‘hard sciences’. A Dynamic Systems Approach holds that individuals comprising societal groups are complex systems, irreducible to simple, uni-causal analyses therefore the morality that develops via these groups is fluid rather than static (Fogel, et al. 2008). Ergo the results of any study that attempts to manipulate belief in free will along a moral dimension cannot be said to truly reflect the validity of the original study given that the place and time are invariably different (Stroebe & Strack, 2013). In this case, both cultural and time variables apply. The present study was conducted in a different place, Sydney, Australia compared with Utah, USA, ten years post original. These factors provide ample reason to believe that moral differences may play an active role in experimental outcome. A further variable related to morality is religion. Given that just over half (n=66) of participants in the present study reported adherence to a religious tradition, it may be that believing that a deity is watching, restrains perceived immoral actions and thus overrides the manipulation effects. Vohs and Schooler’s (2008) study did not state religious affiliation, nonetheless sources have reported personal communication in which it was revealed that approximately half of the participants in their study were practicing Mormons (Zwaan, 2017; Looijen, 2017). From the perspective of evolutionary psychology, religion can be construed as an adaptive mechanism at the group level which provides a cohesive moral framework to ensure group survival (Wilson, 1999). Morality is therefore foundational to

religion as has been recognised by religious scholars (Craig, 2008; Lennox, 2011). Ergo reporting these variables is important.

From the above discussion, regarding replication and the present findings, it appears that the interaction that belief in free-will and morality exhibit in experimental contexts should be the subject of further research. A subset of morality, religion also should be taken into account. Future studies should at the very least report statistics on religious adherence within the sample. Further research elucidating the relationship between specific moral convictions and specific religious traditions on a free will instrument such as the FAD-Plus (Paulhus & Carey, 2011) is necessary.

The present study therefore should not be interpreted as casting doubt upon the validity of the effect reported by Vohs and Schooler (2008) and others (Rigoni, Kuhn, Gaudino, Sartori & Brass, 2012; Rigoni, Kuhn, Sartori, & Brass, 2011; Rigoni, Pourtois, & Brass, 2015; Rigoni, Wilquin, Brass & Burle, 2013) rather, the findings may be seen as a reaffirmation of the importance of understanding the purpose replication plays in psychology and the importance of understanding the role morality and religion may play in priming research on belief in free will.

A major limitation in the present study was the fact that participant data collected using the FAD-Plus scale was corrupted and could not be matched with the participant identifier. The data were therefore discarded, making it impossible to determine whether the prime had been effective. Given that the prime failed in previous replication attempts (Embley, Johnson and Giner – Sorolla, 2015) this may have accounted for the null finding.

Given that the current results were non-significant it may be inferred that lower belief in free will does not significantly impact driver behaviour. Though due to the nature of replication discussed above, more research on this area should be conducted. Despite this finding, depleting belief in free will has been shown to be deleterious in multiple studies (Vohs & Schooler, 2008; Baumeister, Masicampo & DeWall, 2009). In particular it may produce negative social behaviour as noted above (Baumeister & Brewer, 2012). Future directions regarding the relationship between driver behaviour and belief in free will may seek to assess the salience of conformity as an active variable. Due to the fact that decreased belief in 'free will' has been shown to be a predictor of conformity (Alquist, Ainsworth and Baumeister, 2013), it may be that conformity produces a negative effect on driver behaviour. Thus, belief in free will indirectly affects driver behaviour through the medium of conformity. This hypothesis is given some weight by the above mentioned study Møller and Haustein (2014) conducted in which perceptions of peer speeding emerged as the strongest predictor in drivers' speeding behaviour. Given the connection between belief in free will and conformity, and perception of peer speeding and actual speeding behaviour, it is considered at least plausible that belief in free will increases conformity, which in turn increases speeding. This hypothesis is particularly important given the failure of the current experiment to establish a direct link between belief in free will and driver behaviour. The effects of belief in free will on driver behaviour may be more subtle and discrete.

Furthermore, the majority of studies have utilised artificial conditions to lower belief in free will thus future research identifying the natural causes of lower belief rankings should be conducted. This is increasingly salient given recent trends in current culture. For instance, Campbell and Manning (2014) trace the evolution of Western culture through three major stages which they term, *honour culture*, *dignity culture* and *victimhood culture*. 'Victimhood

culture’ has become dominant on many university campuses (Haidt & Lukianoff, 2018). This coincides with the rise of anti-white/anti-male *collectivism* within some faculties and academic institutions (Peterson, 2018; Walter, 2018; Haidt & Likianoff, 2018) and the increasingly Leftward lean of the academic system (Duarte et al., 2015). ‘Victimhood culture’ utilises a ranking system as developed by Gender Marxist scholars such as Morgan (1996) and Collins and Bilge (2016) whereby individuals are grouped by identity characteristics and ranked as either victims or oppressors according to their oppression variables (Haidt & Lukianoff, 2018). Status and standing within a ‘victimhood’ culture are gained by emphasising victimhood claims or by advocating on behalf of those ranked as ‘victims’ (Campbell & Manning, 2014). Two things are notable. Firstly, the word ‘victim’ connotes a denial of choice in a given situation. Secondly an individual is not considered a victim of a specific personal event, rather a perpetual victim of an entire system or of another group with less oppression variables (Haidt & Lukianoff, 2018). It is therefore conceivable that those labelled as ‘victims’ due to their group affiliation may have lower belief in free will. This in turn may lead to negative behavioural consequences, as previously noted. Given the above considerations, further research on this particular issue is necessary.

To conclude, the development of the four major ingredients to the current free will debate can be traced to antiquity. The concept of the Soul necessary for dualist interactionism, the concept of rationality and reason, the concept of physical determinism operating by necessary causation and the concept of the volitional capacity of the mind were developed by Plato, Aristotle, Epicurus and Augustine, respectively. A valid definition of free will should avoid construing free will as a privation or product of indeterminism, rather an ‘*I*’ or ‘*Self*’ (Kane, 1998) with agential control is necessary and comports with current psychological theories of motivation. Defeaters for this view including compatibilism, *reductive materialism*, and *non-*

*reductive materialism* combined with Libet et al's. (1983) research are not successful.

Research on folk beliefs regarding free will has been somewhat contradictory. Nonetheless studies reveal that the majority populace believe the universe is indeterministic and the free will and moral behaviour are incompatible. This holds across culture (Sarkissian et al., 2010). Research on belief in free will has shown that decreasing belief in free will increases negative behaviours like cheating (Vohs & Schooler, 2008), loss of self-control (Rigoni et al., 2012) and increased conformity (Alquist, Ainsworth & Baumeister, 2013). The present study sought to find a link between belief in free and negative driver behaviour. No such link was found. This does not cast doubt on the effect given that the nature of replication is often misunderstood. Future research on belief in free will may seek to find the natural causes of low belief in free will. The rise of victimhood culture as documented by Campbell and Manning (2014) may provide fertile grounds for this search.

## References

- Aarts, H., & van den Bos, K. (2011). On the foundations of beliefs in free will: intentional binding and unconscious priming in self-agency. *Psychol Sci*, 22(4), 532-537. doi:10.1177/0956797611399294
- Alquist, J. L., Ainsworth, S. E., & Baumeister, R. F. (2013). Determined to conform: Disbelief in free will increases conformity. *Journal of Experimental Social Psychology*, 49(1), 80-86. doi:10.1016/j.jesp.2012.08.015
- Alquist, J. L., Ainsworth, S. E., Baumeister, R. F., Daly, M., & Stillman, T. F. (2015). The Making of Might-Have-Beens: Effects of Free Will Belief on Counterfactual Thinking. *Personality and Social Psychology Bulletin*, 41(2), 268-283. doi:10.1177/0146167214563673
- Ansoff, R. (1993). Finding a Home for a Psychology of Volition. *Theory & Psychology*, 3(3), 323-336. doi:10.1177/0959354393033003
- Aristotle. (1978). *On the Movement of Animals*. Princeton: Princeton University Press.
- Aristotle. (2014). *On the Generation of Animals* (T. Gaza, Trans.): First Rate Publishers.
- Augustine. (1964). *On Free Choice of the Will* (T. Williams, Trans.). Indianapolis: Hackett Publishing Company.
- Baumeister, R. F., & Brewer, L. E. (2012). Believing versus Disbelieving in Free Will: Correlates and Consequences.(Report). *Social and Personality Psychology Compass*, 6, 736.
- Baumeister, R. F., Masicampo, E. J., & Dwall, C. N. (2009). Prosocial benefits of feeling free: disbelief in free will increases aggression and reduces helpfulness. *Pers Soc Psychol Bull*, 35(2), 260-268. doi:10.1177/0146167208327217
- Brydges, R., & Butler, D. (2012). A reflective analysis of medical education research on self-regulation in learning and practice. *Medical Education*, 46(1), 71-79. doi:10.1111/j.1365-2923.2011.04100.x
- Butler, D. L. (2002). Individualizing instruction in self-regulated learning. *Theory into practice*, 41(2), 81-92.
- Campbell, B., & Manning, J. (2014). Microaggression and moral cultures. *Comparative sociology*, 13(6), 692-726.
- Cary, P. (2007). A brief history of the concept of free will: issues that are and are not germane to legal reasoning. *Behav Sci Law*, 25(2), 165-181. doi:10.1002/bsl.748
- Chen, Y.-J., Lin, C.-F., & Liu, H.-W. (2018). "Rule of Trust": The Power and Perils of China's Social Credit Megaproject. *Columbia Journal of Asian Law*, 32(1), 1-36.
- Clarke, P. (2015). *All in the Mind?: Does Neuroscience Challenge Faith?* : Lion Books.



- Collins, P. H., & Bilge, S. (2016). *Intersectionality*: John Wiley & Sons.
- Comesaña, J. (2007). Knowledge and Subjunctive Conditionals. *Philosophy Compass*, 2(6), 781-791. doi:10.1111/j.1747-9991.2007.00076.x
- Craig, W. L. (2000). *The only wise God: The compatibility of divine foreknowledge and human freedom*: Wipf and Stock Publishers.
- Craig, W. L. (2008). *Reasonable faith: Christian truth and apologetics*: Crossway.
- Craig, W.L. & Rosenberg, A. (2013). Is Faith in God Reasonable? Biola University (Producer). Retrieved from: <https://www.youtube.com/watch?v=bhfkHQ-CM84&t=3915s>
- Crescioni, A. W., Baumeister, R. F., Ainsworth, S. E., Ent, M., & Lambert, N. M. (2015). Subjective correlates and consequences of belief in free will. *Philosophical Psychology*, 29(1), 41-63. doi:10.1080/09515089.2014.996285
- Crick, F., & Clark, J. (1994). The astonishing hypothesis. *Journal of Consciousness Studies*, 1(1), 10-16.
- Danquah, A. N., Farrell, M. J., & O'boyle, D. J. (2008). Biases in the subjective timing of perceptual events: Libet et al. (1983) revisited. *Consciousness and Cognition*, 17(3), 616-627. doi:10.1016/j.concog.2007.09.005
- Dear, P. (2001). *Revolutionizing the sciences: European knowledge and its ambitions, 1500-1700*: Palgrave Basingstoke, Hants.
- Deery, O., Davis, T., & Carey, J. (2015). The Free-Will Intuitions Scale and the question of natural compatibilism. *Philosophical Psychology*, 28(6), 776-801.
- Doidge, N. (2007). *The brain that changes itself: Stories of personal triumph from the frontiers of brain science*: Penguin.
- Duarte, J. L., Crawford, J. T., Stern, C., Haidt, J., Jussim, L., & Tetlock, P. E. (2015). Political diversity will improve social psychological science 1. 38. doi:10.1017/S0140525X14000430
- Duong, H. T., & Parker, L. (2018). Going with the flow. *Journal of Social Marketing*, 8(3), 314-332. doi:10.1108/jsocm-10-2017-0064
- Feldman, G., Baumeister, R. F., & Wong, K. F. E. (2014). Free will is about choosing: The link between choice and the belief in free will. *Journal of Experimental Social Psychology*, 55, 239-245. doi:10.1016/j.jesp.2014.07.012
- Feldman, G., & Chandrashekar, S. P. (2018). Laypersons' Beliefs and Intuitions About Free Will and Determinism: New Insights Linking the Social Psychology and Experimental Philosophy Paradigms. *Soc Psychol Personal Sci*, 9(5), 539-549. doi:10.1177/1948550617713254

- Flew, A., & Varghese, R. A. (2007). *There is a God: How the world's most notorious atheist changed his mind*: Harper Collins.
- Fogel, A., Greenspan, S., King, B. J., Lickliter, R., Reygadas, P., Shanker, S. G., & Toren, C. (2008). A dynamic systems approach to the life sciences.
- Francis, G. (2012). The psychology of replication and replication in psychology. *Perspectives on Psychological Science*, 7(6), 585-594.
- Freedom in the World 2019; China. (2019). Retrieved from <https://freedomhouse.org/report/freedom-world/2019/china>
- Frith, C. (2013). The psychology of volition. *Experimental Brain Research*, 229(3), 289-299. doi:10.1007/s00221-013-3407-6
- Garcia, T., McCann, E. J., Turner, J. E., & Roska, L. (1998). Modeling the mediating role of volition in the learning process. *Contemporary educational psychology*, 23(4), 392-418.
- Genschow, O., Rigoni, D., & Brass, M. (2017). Belief in free will affects causal attributions when judging others' behavior. *Proc Natl Acad Sci U S A*, 114(38), 10071-10076. doi:10.1073/pnas.1701916114
- Giner-Sorolla, R., Embley, J., & Johnson, L. (2017). Replication of Vohs and Schooler (2008, PS, Study 1). Retrieved from *osf.io/i29mh*.
- Gomes, G. (2007). Free will, the self, and the brain. *Behav Sci Law*, 25(2), 221-234. doi:10.1002/bsl.754
- Gopnik, A. (2009). *The philosophical baby: what children's minds tell us about truth, love, and the meaning of life* / Alison Gopnik. London: Bodley Head.
- Haidt, J., & Lukianoff, G. (2018). *The coddling of the American mind: How good intentions and bad ideas are setting up a generation for failure*: Penguin UK.
- Herodotus. (2003). *The Histories* (A. D. Selincourt, Trans. J. Marincola Ed.). London: Penguin Group.
- Hesketh, T., & Wei Xing, Z. (2004). Effect of restricted freedom on health in China. *British Medical Journal*, 329(7480), 1427.
- Hicks, S. (2011). Explaining postmodernism: Skepticism and socialism from Rousseau to Foucault (Expanded Edition). *Loves Park, IL: Ockham's Razor*.
- Hume, D., & Griffith, T. (2012). *The essential philosophical works*: Wordsworth Editions Limited.
- Husman, & Corno, J. L. (2010). Volitional Control of Learning. In (pp. 724-731).

- Jasny, B. R., Chin, G., Chong, L., & Vignieri, S. (2011). Again, and again, and again.... In: American Association for the Advancement of Science.
- Jeeves, M. (2013). *Minds, Brains, Souls and Gods: A Conversation on Faith, Psychology and Neuroscience*: InterVarsity Press.
- Kane, R. (1998). *The significance of free will*: Oxford University Press on Demand.
- Keller, I., & Heckhausen, H. (1990). Readiness potentials preceding spontaneous motor acts: voluntary vs. involuntary control. *Electroencephalography and Clinical Neurophysiology*, 76(4), 351-361. doi:10.1016/0013-4694(90)90036-J
- Laudan, L. (1981). A confutation of convergent realism. *Philosophy of science*, 48(1), 19-49.
- Lavazza, A. (2016). Free will and neuroscience: from explaining freedom away to new ways of operationalizing and measuring it. *Frontiers in Human Neuroscience*, 10, 262.
- Lazerowitz, M. (1984). Free Will. *Crítica: Revista Hispanoamericana de Filosofía*, 16(48), 3-17.
- Lennox, J. C. (2009). *God's undertaker: Has science buried God?* : Lion Books.
- Lennox, J. C. (2011). *Gunning for God: Why the new atheists are missing the target*: Lion Books.
- Libet, B. (1985). Theory and evidence relating cerebral processes to conscious will. *Behav Brain Sci*, 8(4), 558-566. doi:10.1017/S0140525X00045155
- Libet, B. (2009). *Mind time: The temporal factor in consciousness*: Harvard University Press.
- Libet, B., Gleason, C. A., Wright, E. W., & Pearl, D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential): The unconscious initiation of a freely voluntary act. *Brain*, 106(3), 623-642. doi:10.1093/brain/106.3.623
- Lindahl, B. I. B., & Århem, P. (2019). Motor control and the causal relevance of conscious will: Libet's mind-brain theory. *Journal of Theoretical and Philosophical Psychology*, 39(1), 46-59. doi:10.1037/teo0000102
- Looijen, S. (2017). Situationally dependent changes in moral values: Manipulating moral beliefs using a robotic experimenter.
- Lorenz, H. (2009). Ancient Theories of Soul. Retrieved from <https://plato.stanford.edu/entries/ancient-soul/#pagetopright>
- MacKenzie, M. J., Vohs, K. D., & Baumeister, R. F. (2014). You didn't have to do that: belief in free will promotes gratitude. *Pers Soc Psychol Bull*, 40(11), 1423-1434. doi:10.1177/0146167214549322

- Makel, M. C., Plucker, J. A., & Hegarty, B. (2012). Replications in psychology research: How often do they really occur? *Perspectives on Psychological Science*, 7(6), 537-542.
- Maoz, U., Mudrik, L., Rivlin, R., Ross, I., Mamelak, A., & Yaffe, G. (2014). *On Reporting the Onset of the Intention to Move*: Oxford University Press.
- Marchais-Roubelat, A., & Roubelat, F. (2011). The Delphi method as a ritual: Inquiring the Delphic Oracle. *Technological Forecasting and Social Change*, 78(9), 1491-1499. doi:10.1016/j.techfore.2011.04.012
- Matsushashi, M., & Hallett, M. (2008). The timing of the conscious intention to move. *European Journal of Neuroscience*, 28(11), 2344-2351. doi:10.1111/j.1460-9568.2008.06525.x
- Maurizio, L. (1997). Delphic oracles as oral performances: authenticity and historical evidence. *Classical Antiquity*, 16(2), 308-334.
- McKay, T. J., & Johnson, D. (1996). A reconsideration of an argument against compatibilism. *Philosophical Topics*, 24(2), 113-122.
- Mele, A. R., & William, H. (2009). *Effective intentions: The power of conscious will*: Oxford University Press on Demand.
- Miller, J., Shepherdson, P., & Trevena, J. (2011). Effects of clock monitoring on electroencephalographic activity: Is unconscious movement initiation an artifact of the clock? *Psychological Science*, 22(1), 103-109.
- Moller, M., & Haustein, S. (2014). Peer influence on speeding behaviour among male drivers aged 18 and 28. *Accid Anal Prev*, 64, 92-99. doi:10.1016/j.aap.2013.11.009
- Monroe, A. E., Brady, G. L., & Malle, B. F. (2017). This isn't the free will worth looking for: General free will beliefs do not influence moral judgments, agent-specific choice ascriptions do. *Social Psychological and Personality Science*, 8(2), 191-199.
- Monroe, A. E., Dillon, K. D., & Malle, B. F. (2014). Bringing free will down to Earth: people's psychological concept of free will and its role in moral judgment. *Conscious Cogn*, 27, 100-108. doi:10.1016/j.concog.2014.04.011
- Monroe, A. E., & Malle, B. F. (2009). From Uncaused Will to Conscious Choice: The Need to Study, Not Speculate About People's Folk Concept of Free Will. *Review of Philosophy and Psychology*, 1(2), 211-224. doi:10.1007/s13164-009-0010-7
- Moreland, J. P., Moreland, J. P., & Craig, W. L. (2003). *Philosophical foundations for a Christian worldview*: InterVarsity Press.
- Morgan, K. P. (2018). Describing the emperor's new clothes: Three myths of educational (in) equity. In *The Gender Question In Education* (pp. 105-122): Routledge.

- Nadelhoffer, T., Shepard, J., Nahmias, E., Sripada, C., & Ross, L. T. (2014). The free will inventory: Measuring beliefs about agency and responsibility. *Consciousness and Cognition*, 25, 27-41.
- Nahmias, E., Morris, S., Nadelhoffer, T., & Turner, J. (2006). Surveying Freedom: Folk Intuitions about free will and moral responsibility. *Philosophical Psychology*, 18(5), 561-584. doi:10.1080/09515080500264180
- Pashler, H., & Wagenmakers, E. J. (2012). Editors' introduction to the special section on replicability in psychological science: A crisis of confidence? *Perspectives on Psychological Science*, 7(6), 528-530.
- Paulhus, D., & Margesson, A. (1994). Free will and determinism (FAD) scale. *Unpublished manuscript, University of British Columbia, Vancouver, British Columbia, Canada.*
- Paulhus, D. L., & Carey, J. M. (2011). The FAD-Plus: Measuring lay beliefs regarding free will and related constructs. *Journal of personality assessment*, 93(1), 96-104.
- Peterson, J. B. (2018). *12 rules for life: An antidote to chaos*: Random House Canada.
- Plant, B. R., Irwin, J. D., & Chekaluk, E. (2017). The effects of anti-speeding advertisements on the simulated driving behaviour of young drivers. *Accid Anal Prev*, 100, 65-74. doi:10.1016/j.aap.2017.01.003
- Plantinga, A. (2011). *Where the conflict really lies: Science, religion, and naturalism*: OUP USA.
- Plato. (1956). *Great Dialogues of Plato* (W. Rouse, Trans.). New York: The New American Library
- Purinton, J. (1999). Epicurus on 'Free Volition' and the Atomic Swerve. *Phronesis*, 44(4), 253-299. doi:10.1163/15685289960464601
- Qianfan, Z., & Yingping, Z. (2011). Religious Freedom and Its Legal Restrictions in China. *Brigham Young University Law Review*, 2011(3), 783-818.
- Rakos, R. F., Laurene, K. R., Skala, S., & Slane, S. (2008). Belief in free will: Measurement and conceptualization innovations. *Behavior and Social Issues*, 17(1), 20-40.
- Rigoni, D., Kühn, S., Gaudino, G., Sartori, G., & Brass, M. (2012). Reducing self-control by weakening belief in free will. *Consciousness and Cognition*, 21(3), 1482-1490. doi:10.1016/j.concog.2012.04.004
- Rigoni, D., Kühn, S., Sartori, G., & Brass, M. (2011). Inducing Disbelief in Free Will Alters Brain Correlates of Preconscious Motor Preparation: The Brain Minds Whether We Believe in Free Will or Not. *Psychological Science*, 22(5), 613-618. doi:10.1177/0956797611405680

- Rigoni, D., Pourtois, G., & Brass, M. (2015). 'Why should I care?' Challenging free will attenuates neural reaction to errors. *Social, Cognitive and Affective Neuroscience*, 10(2). doi:10.1093/scan/nsu068
- Rigoni, D., Wilquin, H., Brass, M., & Burle, B. (2013). When errors do not matter: weakening belief in intentional control impairs cognitive reaction to errors. *Cognition*, 127(2), 264-269. doi:10.1016/j.cognition.2013.01.009
- Rosenberg, A. (2011). *The atheist's guide to reality: Enjoying life without illusions*: WW Norton & Company.
- Roskies, A. (2006). Neuroscientific challenges to free will and responsibility. *Trends Cogn Sci*, 10(9), 419-423. doi:10.1016/j.tics.2006.07.011
- Roston, B. C. a. M. (2015). Three Popular Psychology Studies That Didn't Hold Up Retrieved from <https://www.nytimes.com/interactive/2015/08/28/science/psychology-studies-redid.html>
- Sagan, C. (2007). The fine art of baloney detection. *Paranormal Claims: A Critical Analysis*, 1.
- Sarkissian, H., Chatterjee, A., De Brigard, F., Knobe, J., Nichols, S., & Sirker, S. (2010). Is Belief in Free Will a Cultural Universal? *Mind & Language*, 25(3), 346-358. doi:10.1111/j.1468-0017.2010.01393.x
- Schurger, A., Mylopoulos, M., & Rosenthal, D. (2016). Neural antecedents of spontaneous voluntary movement: a new perspective. *Trends in Cognitive Sciences*, 20(2), 77-79.
- Schurger, A., Sitt, J. D., & Dehaene, S. (2012). An accumulator model for spontaneous neural activity prior to self-initiated movement. *Proceedings of the National Academy of Sciences*, 109(42), E2904-E2913.
- Shariff, A., Greene, J. D., Karremans, J., Luguri, J., Clark, C. J., Schooler, J. W., & Vohs, K. (2018). Corrigendum: Free Will and Punishment: A Mechanistic View of Human Nature Reduces Retribution. *Psychological Science*, 29(2), 311-311. doi:10.1177/0956797617750381
- Soon, C. S., Brass, M., Heinze, H.-J., & Haynes, J.-D. (2008). Unconscious determinants of free decisions in the human brain. *Nature neuroscience*, 11(5), 543.
- Speeding. (2019). Retrieved from <https://roadsafety.transport.nsw.gov.au/speeding/index.html>
- Stroebe, W., & Strack, F. (2014). The alleged crisis and the illusion of exact replication. *Perspectives on Psychological Science*, 9(1), 59-71.
- Stump, E., Meconi, D. V., & Stump, E. (2014). Augustine on free will. In *The Cambridge Companion to Augustine* (pp. 166-186).
- Swinburne, R. (2016). *The coherence of theism*: Oxford University Press.

- Swinburne, R. (2013). *Mind, brain, and free will*: Oxford University Press.
- Tallis, R. (2016). *Aping mankind*: Routledge.
- Trager, B. M. (2013). *The consequences of disbelief in free will: Diminished morality or enhanced conformity?* : Florida Atlantic University.
- Trevena, J., & Miller, J. (2010). Brain preparation before a voluntary action: Evidence against unconscious movement initiation. *Consciousness and Cognition*, 19(1), 447-456. doi:10.1016/j.concog.2009.08.006
- Trevena, J. A., & Miller, J. (2002). Cortical movement preparation before and after a conscious decision to move. *Consciousness and Cognition*, 11(2), 162-190.
- Tse, P. (2013). *The neural basis of free will: Criterial causation*: Mit Press.
- Van Inwagen, P. (2017). *Thinking about free will*: Cambridge University Press.
- Velten Jr, E. (1968). A laboratory task for induction of mood states. *Behaviour research and therapy*, 6(4), 473-482.
- Victor Alexandru, P. (2013). Is Plato a dualist? *Agathos: An International Review of the Humanities and Social Sciences*, IV(2), 35-44.
- Vohs, K. D., & Schooler, J. W. (2008). The Value of Believing in Free Will: Encouraging a Belief in Determinism Increases Cheating. *Psychological Science*, 19(1), 49-54. doi:10.1111/j.1467-9280.2008.02045.x
- Walters, S. D. (2018). Why Can't We Hate Men? Retrieved from [https://www.washingtonpost.com/opinions/why-cant-we-hate-men/2018/06/08/f1a3a8e0-6451-11e8-a69c-b944de66d9e7\\_story.html](https://www.washingtonpost.com/opinions/why-cant-we-hate-men/2018/06/08/f1a3a8e0-6451-11e8-a69c-b944de66d9e7_story.html)
- Weatherford, R. (2017). *The implications of determinism*: Routledge.
- Wegner, D. M. (2017). *The illusion of conscious will*: MIT press.
- Wilson, D. (2010). *Darwin's cathedral: Evolution, religion, and the nature of society*: University of Chicago press.
- Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational psychologist*, 38(4), 189-205.
- Zhu, J. (2004). Locating volition. *Conscious Cogn*, 13(2), 302-322. doi:10.1016/j.concog.2003.09.003
- Zimmerman, B. J. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational psychologist*, 48(3), 135-147.

Zwaan, R. (2013). The Value of Believing in Free Will: A Replication Attempt. Retrieved from <https://rolfzwaan.blogspot.com/2013/03/the-value-of-believing-in-free-will.html>