SITUATIONAL INFLUENCES OF RELIGIOUS VS. SECULAR SYMBOLS ON COGNITION IN NIGERIA

A thesis submitted for the degree of Doctor of Philosophy

by

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Abstract

Nigeria is constitutionally a secular country but its citizens are rated among the most religious in the world by several surveys. Religious symbolism is conspicuous in Nigeria, littered from educational institutions to work environments and market places. Semiotics and semantics have a rich history of the study of symbols, however, symbols are also utilized as primes in psychology. Research in social and cognitive psychology suggest that symbols, particularly when embedded with emotive meaning, serve to reinforce particular associated and learnt constructs. The present thesis assesses how religious vs. secular symbols interact with specific cognitive processes and mechanisms (Type I and Type II cognitive processes, agency detection, need for cognitive closure, and immortality bias). Five studies were carried out in Nigeria. Study One showed a high rate of God references in two non-religious Nigerian national newspapers (broadsheet and tabloid). The hypotheses of Studies Two to Five were tested across religious vs. secular situational influences. Studies Two and Three tested hypotheses related to the rationality vs. religion debate through the default interventionist dual process theory. Study Four assessed how Nigerian children (aged 5 to 11 years old) conceive of retrograde immortality through reasoning by analogy about future immortality. Study Five A replicated the previously-reported correlation between need for cognitive closure and religious fundamentalism. Study Five B showed that when uncertainty is primed in individuals the detection of supernatural agency positively mediates, and the detection of human agency negatively mediates, the relationship between need for cognitive closure and religious fundamentalism. Aspects of dual processes theories and the Cognitive Science of Religion (CSR) that are concerned with implicit cognitive functions directly informed this series of experiments, however conformity and self-theories offer complementary explicit/social perspectives. Two sets of recommendations are offered; the first addresses future research in psychology, such as the separation of content from process in the rationality vs. religion debate. The second addresses policy recommendations at three interconnected levels (macro, institutional, and individual).

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Author's Declaration

I hereby declare that this Ph.D thesis entitled "Situational Influences of Religious vs. Secular Symbols on Cognition in Nigeria" was carried out by me for the degree of Doctor of Philosophy in Psychology under the guidance and supervision of Dr. Michael E. Price at Brunel University London. This thesis has not been submitted for any other degree or qualification. All sources of data, ideas, and words either direct or paraphrased that are not mine have been appropriately cited.

……M.A.I……

MARK ABIYE IRUAYENAMA

(26th January, 2016)

List of Acronyms

ADD	Agency detection device
CEST	The cognitive experiential self-theory
CRT	Cognitive response test
CSR	Cognitive science of religion
DSA	Detection of supernatural agency
DHA	Detection of human agency
EB	Epistemological beliefs
EEA	Environment of evolutionary adaptedness
EMT	Error management theory
HADD	Hyperactive agency detection device
NFC	Need for closure
NFCC	Need for cognitive closure
REI-40	The rational experiential inventory
RF	Religious fundamentalism
RRIIR	Religiosity-related inferential irrationality
RT	Response time
ToM	Theory of mind
SES	Socioeconomic status
ST	Simulation theory
TASS	The set of autonomous subsystems
TT	Theory theory
WEIRD	Western, Educated, Industrialized, Rich, and Democratic

CHAPTER 1

1. Introduction

Religious symbolism is conspicuous in all spheres of Nigerian society, from print, audio and video media outlets to all levels of institutions of learning. What effects do these religious symbols have on the cognition of individuals in Nigerian society? Are these religious symbols merely decorative expressions of allegiance (e.g., the crucifix for Catholics and the crescent moon for Muslims)? Do these symbols serve to reinforce religious ideas learnt repetitively from childhood and dominant within society? Or do these symbols serve the two questions posed earlier, as well as interact with default cognitive mechanisms that predispose us to religiosity?

Anthropologists, particularly material social anthropologists, emphasise the importance of cultural artefacts in understanding the collective consciousness of societies (e.g., Henare, Holbraad, & Wastell, 2007). The study of symbols, through semiology (Saussure, 1916; 1986) and semiotics (Peirce, 1955; 1978) has a rich relationship with psychoanalysis (e.g., Freud, 1899; Jung, 1959, 1963; Lacan, 1978, 1988) but fails to integrate the insights offered by other more contemporary fields of psychology, gained through the use of symbols as experimental primes[1]. Theorists (e.g., Bouissac, 2007) argue that for the study of signs to advance further, it will need to transcend its present linguistic and philosophical approach and move towards psychological frameworks.

The present thesis offers a multidisciplinary approach to the study of the situational effects of religious vs. secular symbols, with a particular emphasis on cognitive psychology and the cognitive science of religion (CSR). All the experiments in the present thesis were carried out in Nigeria; Studies One, Two Four and Five were carried out in the former capital (Lagos), while Study Three was carried out in the present capital (Abuja).

[1]For an exception see biosemiotics which advances a nature-culture coevolution (e.g., Hoffmeyer, 1997, 2007, 2008; Kampis, 1998; Kull, 2000; Maran & Kleisner, 2010).

Study One was carried out as an unobtrusive and inexpensive introduction into research in Nigeria, where all later studies were also carried out. This study quantified the number of God references in two non-religious Nigerian national newspapers. In Study Two and Three, dual-process theories in cognitive psychology were utilized to assess the diametric effects of supraliminal exposure to religious vs. secular symbols. These studies engaged with the rationality vs. religion debate, and contrary to popular secular opinion, argues that religious belief can be rational, albeit only specific facets of rationality are considered (e.g., epistemological rationality and not inferential rationality). Study Four was carried out with children aged between five and eleven years old and analysed the effect of exposure to religious vs. secular symbolism on immortality bias. Study Five engaged with the Cognitive Science of Religion (CSR) to analyse how agency detection explains (i.e., mediates) the relationship between the need for cognitive closure and religious fundamentalism, under religious and secular situational influences. See Chapter 3.8 for a more comprehensive description of all the experiments carried out.

1.1 Research Setting and Epistemological Relevance

Henrich, Heine, and Norenzayan (2010) point out the need for research in psychology outside the Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies to diversify our sources of knowledge and broaden our understanding of human variation. Henrich et al. criticise the formulation and empirical validation of psychological theories based on studies carried out with WEIRD participants, suggesting that WEIRD participants are particularly unusual in comparison to the rest of the world's population. The first point has been widely welcomed (e.g., Ceci, Kahan, & Braman, 2010; Lancy 2010), the second point however, has received much criticism, that instead WEIRD participants are closer to human nature (e.g., Bennis & Medin, 2010; Maryanski, 2010). Nonetheless, the cognitive constructs assessed in the present thesis are theorized to be ubiquitous across culturesas a result of our common evolutionary past (Atran, 2002; Barrett, 2000; Boyer, 2001) but subject to situational influences (e.g., highly religious cultures, threatening, ambiguous,

and uncertain situations).

Religion permeates Nigerian society (Adeboye, 2012; Marquette, 2012), it is estimated that about 93% of all Nigerians practice either of the two world dominant doctrinal religions, Christianity and Islam (Chiluwa, 2012; Mandryk & Johnstone, 2001). A 2010 Gallup Global Report showed that 96% of Nigerians rated religion as being an important part of their life. A more direct measure, the Global Index of Religion and Atheism (WIN-Gallup, 2012) rated Nigeria as the second most religious country (93%) out of 57 countries.Some research has been carried out on religion in Nigeria including research on Christian miracles obtained through cyberspace (Chiluwa, 2012), a call to view religion as a "crucial" component of education (Olademo, 2011), an argument in favour of training in Christian political leadership (Omenka, 2009), a religious approach toward health care (2011), the humanitarian efforts of religion (Orji 2011), and on the peaceful coexistence among religions (Fatokun, 2009). The studies in the present thesis however were principally concerned with the specific cognitive mechanisms and processes responsible for the acquisition of religion in the first place, and the situational influences of religious vs secular symbols on cognition.

Islam and Christianity share many facets in common, such as belief in the same monotheistic Abrahamic God, repentance, forgiveness of sins, and damnation (Peters, 2004), the present thesis however utilized only Christian symbols for the religious category. Therefore, the fieldwork was carried out in parts of Nigeria where Christianity is dominant or is as dominant as Islam. No data were collected from parts of Nigeria where Islam is the only dominant religion. Muslims however that lived in the regions where the studies were carried out were not excluded, because they live in a culture where Christian doctrine and symbols are dominant (e.g., through the presence of Christian billboards, TV adverts and programmes, radio programmes, music, car stickers, films, and in conversation with peers).

1.2 The Multifaceted and Paradoxical Nature of Religion

Religion exerts a paradoxical and tremendous influence over human affairs (Hogan 2004). Religion unifies individuals across cultures through shared values (Johnson & Bering 2006; Johnson & Kruger, 2004), where fellow believers are considered as fictive kin, and God is considered as an attachment figure (Kirkpatrick 2004), but religion also divides individuals by constructing out-group members (Hunsberger & Jackson, 2005). Religion encourages altruistic behaviour, particularly towards ingroup members (Batson 1983), and appeals to an innate intuitive regard for morality and decency (Ebstyne & Furrow, 2008) but religion has also been the justification for inhumane violence (Juergensmeyer, 1993; 2002, Kimball, 2002). Religion promotes pro-social behaviour (Ali, 2011; Johnson et al., 2003), but also encourages anti-social behaviour such as egotism (Pichon, Boccato & Saroglou, 2007). The complexity of religion hinders a comprehensive definition, therefore, studies investigating the influence of religion on behaviour must be specific about the particular facet/s being investigated, and about what religion in particular is being investigated.

The present study assessed Christianity and utilized Christian icons. Christianity in the present thesis is not conceptualised as synonymous with religion but as merely a historically-recent expression of religion, which has borrowed from previous religions, and is confined to a specific set of cultures, albeit the biggest set in comparison with other contemporary religions (Robert 2009). All the paradoxes mentioned above can be found in Christianity to varying extents; for instance, Christianity unites individuals across races and countries (Emerson & Kim, 2003), yet within particular countries and periods, Christianity has caused division and hostility among its denominations (e.g., Catholics vs. Protestants in Ireland during the late 20th century). Despite the paradoxes within Christianity, there are however some certainties within mainstream Christianity across all denominations, two of which are of specific interest to the present thesis; reward for belief/faith in the Christ and punishment for disbelief.

1.2.1 Reward and Punishment in Christianity

The Bible is the definitive text of Christianity; all consequential teachings in the latter are derived from the former (Migliorebs, 2004). Every Christian is expected to read the Bible, save those prevented by a biological or social handicap (e.g., blindness or illiteracy). The Bible contains strict instructions such as the rewards for believing in God, and the consequences for not believing in God. For instance, John 6:47 (KJV) states "Verily, verily, I say unto you, He that believeth on me hath everlasting life". Act 16:31 (KJV) reads "…believe on the Lord Jesus Christ, and thou shalt be saved, and thy house". Hebrews 11:6 (KJV) reads "But without faith *it is* impossible to please *him*: for he that cometh to God must believe that he is, and *that* he is a rewarder of them that diligently seek him". See Appendix G (I) for a non-comprehensive list of the rewards noted in the Bible for belief in the Christian God.

The sharp line between Heaven and Hell, as reward and punishment is a legacy left by the protestant reformation, which challenged the five states of afterlife (Heaven, Limbo for the righteous who came before Christ, Limbo for infants, Purgatory, and Hell) offered by the medieval church (Marshall, 2010). The ideal Ockham's razor utilized by Reformed, Protestant reformers, and Lutherans alike was to reference the Bible, which made no provision for a middle ground between reward and punishment. Just like the rewards outlined above, numerous verses in the Bible also warn against the consequences of not believing in the Abrahamic God. For instance, John 3:18 (KJV) states "… he that believeth not is condemned already, because he hath not believed". John 3:36 (KJV) also states that "… he that believeth not the Son shall not see life; but the wrath of God abideth on him". Revelation (20:10, KJV) describes Hell as a lake of fire and sulphur, Matthew (13:50, KJV) reasserts that it is a fiery furnace "where there will be weeping and gnashing of teeth", and Mark (9:48, KJV) informs that the fire never quenches. Mark (9:47, KJV) further advises that it is better to pluck out an eye if it offends one than to be cast into Hell with both eyes. Appendix G (II) for a non-comprehensive list of the negative attributes of scepticism/disbelief in the Abrahamic God in the Bible.

1.3 Types of Signs Utilized

It is necessary to distinguish between three types of signs as proposed by Peirce (1955, 1978).According to Peirce, there are three kinds of signs: *Symbol*, which does not bear resemblance to that which it signifies (e.g., swastika for Nazi ideology), *Icon*, which bears resemblance to that which it signifies (portrait of Christ for Christianity), and *Index*, which bears a causal/consequential relationship to that which it signifies (e.g., smoke for fire). Peirce's classification has been further extended by Sebeok (1994) to include *Signals*, which elicit a mechanical response, *Symptoms,* whichelicit a natural, automatic and non-arbitrary response to that which it signifies, and *Names,* which classify extensions. The present study utilised icons and symbols, however as Peirce recognised, and as Chandler (2002) emphasises, these distinctions are not mutually exclusive: an index can be an icon, an icon can be symbol, and a symbol can be an index. Chandler illustrates this using a map as an example; a (two dimensional) map can be indexical in the sense that it marks locations, therefore a consequence of the presence of the marked position being in that particular place. A (two-dimensional) map can be iconic in the sense that it maps exact scaled distances between locations, and symbolic in the sense that it does not bear a natural resemblance to the place it signifies. Therefore, in the present thesis, which is principally concerned with psychology, symbols, icons, and signs will be used interchangeably, according to the context in which it is being used.

Classic semiotic theory can be assessed through two different frameworks: Saussure's dyadic approach (1916;1986) and Peirce's (1955) triadic approach. Saussure postulates that signs are comprised of two components, the signifier and the signified. Taking an example from one of the icons utilized in the present study; punitive religious iconography (depiction of Hell), the signifier is the image that depicts Hell, while the signified is the place called Hell. Crucially, according to Saussure, the signified is a concept conceived in the perceiver's mind and not a physical entity (i.e., an idea of Hell not the actual place called Hell). Langer (1951) expands the point that signs are not generally viewed as proxies for the objects they represent, but as conveyors for the conception of

the objects they are meant to represent (Langer, 1951; also see Aristotle, cited in Richards, 1932). Saussure further posits that the relationship between the signifier and the signified is arbitrary, defined by one's community. Building on our example, the conceptualisation of Hell can differ across communities, for instance one community can conceptualise Hell as a place of eternal damnation for all sinners, while another community might conceptualise Hell as a fictional tale of a distant culture. Consequently, Saussure emphasises that a sign has no meaning independent of context and of other signs. According to Saussure, the negative relationship between signs is particularly important in defining the signs themselves. For instance, in the present chapter, the punitive religious icon utilized gains its particular iconic context in light of the other religious icon utilized (i.e., benign religious iconography), and both religious icons gain their particular iconic context in light of another opposite icon utilized (i.e., secular iconography). The extent to which these symbols are conceived of as opposites will depend on the perceiver, as outlined above; this is why the link between the signifier and the signified is arbitrary.

Peirce (1955, 1978) offers a triadic semiotic theory, which postulates that signs are comprised of three components, the representamen, the object, and an interpretant. Taking an example from one of the icons utilized in the present study, i.e., punitive religious iconography, the representamen is the form of the icon (e.g., depiction of Hell), this is conceptually similar to Saussure's signifier. The object will be Hell, i.e., that which the form refers to. Peirce's object differs from Saussure's signified in that Saussure conceives of the signified in the Aristotelian sense, i.e., a general concept of the signified that the signifier stands for, while Peirce conceives of the object as a physical reality which the representamen stands for. Peirce's third facet of the sign, the interpretant, will be the interpretation of the link between the representamen and the object, i.e., the interpretation of the link between the depiction of Hell and the place referred to as Hell. This subjective interpretation, which is also present in Saussure's signifier-signified link, but more elaborately detailed as a third facet, i.e., interpretant, in Peirce's model, is of particular importance in the approach of the present chapter, which focuses on the conditions (internal cognitive conditions, and to a lesser extent external sociocultural conditions) which direct the

influence of religious signs.

Cousins (2012), in his semiotic treatment of mind and culture, and in reaction to Saussure's signifier and signified dyad, suggests that the dyad model (as well as Peirce's triad model) offers insufficient explanatory power when signs are intended to have a goal. Peirce's triadic modelis problematic because it deviates from the consensus that signs ought to represent the concept of a thing, not the thing itself. Peirce's model also lacks the clarity of a primary reference (i.e., signifier - signified). Cousins departs from Peirce's triadic model by building on Saussure's dyad model and adding a third facet (to Saussure's) to propose a Telic Triad model which offers an even more appropriate and contemporary framework for the present chapter. Cousinshas named this third facet the *intendant*, which encompasses both an intended outcome and a perceiver who anticipates that outcome. For instance, in the punitive religious icon used in the present chapter (i.e., depiction of Hell), both the intended outcome (the goal of the sign) and the interpretation will be that the perceiver is reminded of the consequence of sin (e.g., eternal punishment). The interpretation of the intendant, however, will only hold for the interpreter within the same cultural/religious worldview as the creator of the sign. Within a different cultural/(anti-) religious worldview, for instance, the same sign might have an intended goal to mock the belief in Hell, which an atheist might correctly interpret and be amused by (as intended). A believer, however, might also correctly interpret the sign but not find it funny (which in itself might or might not have been the goal of the creator of the sign). Cousins's triad model therefore offers a more appropriate theoretical framework to situate the present chapter because it offers an avenue for the arbitrary interpretation of the signifier-signified link, through the intendant.

For a recent religiosity-related example of the intricacy of sign semiotics, Ling (2010) documents how the fast-food chain McDonald's in Singapore suffered an embarrassment when its *intendant* in a Chinese zodiac souvenir promotion was misconstrued by a particular cultural group (the Chinese), as a result of McDonald's attempt to avoid upsetting a different cultural group (Muslims). Singapore has a huge Chinese population, and the Chinese zodiac calendar is

made up of twelve animals including a pig. Islam is also one of the major religions in Singapore, and Muslims do not interact with pigs.Therefore, McDonald's anticipating a negative interpretation of their *interndant,* replaced the pig souvenir with a souvenir of Cupid. Quek and Ling (2013) analysed 97 documents, including online newspapers and news station forums, to show that a significant percentage of the Chinese population were offended. They (the Chinese) were offended because the Chinese Zodiac is an important part of their cultural heritage, and they felt it ought not to be tampered with.

The present thesis is interested in how our cognitive architecture biases the way we react to religious vs. secular signs, and to a lesser extent how sociocultural conditioning aids this process. The psychological approach to semiosis therefore is decidedly implicit, i.e., focused on why the interpretant interprets the way she does, which can be easily situated within Saussure's or Peirce's model. However, because the icons utilised serve specific goals (i.e., punitive religious reminders of supernatural punishment, benign religious reminders of God's love, and secular reminders to think logically and rationally), Cousins's triad model offers the most appropriate framework.

1.4 The Self and Religion

The recorded history of the self in the West can be traced at least as far back to the *gnothi seauton* (know thyself) of the Delphic Oracle. The 'self' has remained relevant through Shakespeare's "this above all, to thine own self be true" (Shakespeare, trans. 1934, 1.3.79) to William James's self-theory (1890), down to the contemporary notions of disembodied minds (Blose, 1981) and a sanitized account of Freud's (1915) unconscious (i.e., as greatly influential but without the Freudian conflicts such as sexuality and Oedipal libido).Locke (1690), in his polemical work *An Essay Concerning Human Understanding,* philosophized that the self was completely a product of experience and education, which fitted in with his thesis of the mind as a tabula rasa (i.e., blank slate). This view of the mind as a blank slate—which was later championed by stimulus-response behaviourism (Skinner, 1938), and shortly thereafter largely discredited by the cognitive revolution (e.g., Chomsky, 1959)--was quite influential in the long line of ideological shifts that has led to the present

noncontroversial view of the self as entirely corporeal.

Locke (1690) likened the self to the consciousness of being (e.g., consciousness of pain, pleasure, happiness, and misery). That is, one's self is not one's physical attributes such as one's face or limbs, but self-awareness. This view, particularly when seen through Hobbes' (1950) assertion that man is entirely corporeal and no metaphysical entities exist either in the form of Christian angels or Descartes' rational soul, was in direct confrontation with the medieval church (Porter, 2003). Medieval theology envisioned the body as a dungeon for the soul, therefore self-denial (e.g., monastic asceticism and celibacy) and general self-distrust were considered virtuous. The mechanistic philosophies of the 17th century increasingly freed up individuals to engage in self-discovery and self-expression, for instance through self-portraits and autobiographies (Porter, 2003). Consciousness however is not all there is, and Freud's (1915) influential work in fleshing out a theory of the conscious and unconscious, with the latter having a greater influence than the former on one's self, set the stage for contemporary dual-process theories (of the conscious and the unconscious). The present thesis will utilize these dual-process theories as an explanatory framework for the series of experiments carried out.

James (1890), in his *Principles of Psychology*, offered a more holistic concept of self than Locke's (1690) likening of the self to the contents of consciousness. James extended the concept of self to include the different aspects of one's self, as well as the entirety of one's possessions, including one's material assets (e.g., house and car) and one's relationships (e.g., family and friends). The self, as conceived by James, is divided into two classes: the "me" (i.e., the material self, the social self, and the spiritual self) and "I" (i.e., the pure ego). The material self, as the name implies, refers to everything corporeal intimately associated with one's self (i.e., one's body, family, house, cars, etc.).The social self refers to one's interaction within society and the recognition one receives therein.The spiritual self refers to one's psychic dispositions.And the pure ego, finally, is very similar to Locke's stream of consciousness (i.e., a subjective sense of a personal present identity that is consistent with the past and imagined future). Following James's self theory, the study of the self has been widely explored within psychology. Sirgy (1982) lists the various ways in which

self-concept has been construed across different branches of psychology, presented below in tabular form.

Table 1

Interpretation of Self-Theory Across Various Psychological Theories, Tabularized Based on Text in Sirgy (1982)

Psychological Theory	Interpretation of Self-Concept
Psychoanalytic theory	A conflicted self system
Behavioral theory	A system of conditioned responses
Organismic theory	Functional/developmental approach
Phenomenology	A holistic approach
Cognitive theory	Conceptual system processing approach
Symbolic interactionism	A system of interpersonal interactions

1.4.1 William James's Social Self, Erving's Dramaturgical Analysis, and Conformity

James's (1890) social self hypothesis foreshadowed the rise in conformity studies in psychology which began in earnest in the 1930s, albeit with the view that one can alter one's behaviour multiple times across multiple contexts as an expression of their different social selves. According to James, this seamless transition of the self to match the character of valued others (e.g., family, friends, authority figures) arises due to need for recognition. To equate James's social self as a conforming self, however, may be a misreading of the social self, because rather than transforming behaviour to match those of valued others, James posits that different aspects of one's self are revealed in different contexts (e.g., in a religious gathering vs. secular party setting). James, however, was not clear on how the individual would react if the particular character of a valued other were not in his repertoire of social selves, that is,

whether or not that individual would assume a new social self.

To gain more insight into how individuals display multiple sides of themselves in different contexts, it will be worth considering Erving's (1959) dramaturgical analysis. Erving (1959), using the theatre as an analogy, likened individuals to actors who put up different acts to please their present audience (i.e., the person or group of people the individual is communicating with). This acted-out presentation of self occurs in the front region (i.e., like a theatre stage), while the back region (i.e., like a theatre's backstage) is the individuals personal mental space where he/she plans the actions to be executed in the front region. Within this framework, emphasis is placed on the present situational context in understanding human interaction. Unlike James's social self, Erving's various acted-out selves do not necessarily have to be part of the individual's (multiple) identity, but an identity merely put on for acceptance, as an actor would expect from his audience. However, what happens when an individual is confronted with an audience with an obviously incorrect or unexpected answer/attitude? What happens when an individual, or actor, is in an ambiguous situation?

Individuals conform when they alter their beliefs and behaviours to be consistent with social norms (Cialdini & Goldstein, 2004; Deutsch & Gerald, 1955; Effersona et al., 2008; Nail, MacDonald, & Levy, 2000; Renkema et al., 2008; Sherif, 1935). Sherif (1935) was one of the first researchers to explore conformity in an experiment that utilized the autokenetic effect. The autokenetic effect occurs because during the perception of a jittery stimulus, the brain corrects the jittery movement by making reference points with other stimuli in close proximity, to make the jittery stimulus appear steady. However, in the absence of reference points such a stimulus will appear unsteady. Sherif (1935) asked participants to make notes measuring the movement of a stationary light with no other object in proximity (a light source in a dark room).The results of the study demonstrated that individual participants altered their answers to match those of the collective group. Asch (1951) also showed that participants adhered to an obviously wrong answer when that answer was collectively agreed-upon by the group (group members, unbeknownst to the participant, were confederates of the experimenter).

Classic conformity studies distinguish between normative and informational conformity (Deutsch & Gerald, 1955). Normative conformity is theorized to occur when individuals alter their behaviour to obtain and/or maintain group desirability (Lonnqvist et al., 2009; Navarrete, Hall, & Fessler, 2005), and avoidance of social disproval (Cialdini & Goldstein, 2004). Informational conformity is theorized to occur when individuals alter their behaviour due to a desire for accuracy; it is more internalised than normative conformity and its effect is more pronounced when the individual lacks competent information (Lonnqvist et al., 2009). Researchers interested in the automaticity paradigm have carried out experiments to investigate if individuals can indeed be primed to conform beyond their awareness, automatically and non-consciously. For instance, Epley and Gilovich (1999) demonstrated that participants primed with conformity through a scrambled sentence task conformed more with experimental confederates than participants who were not primed.

Numerous studies have shown that religion increases conformity.For instance, Van Cappellen et al. (2011) showed that religious priming increases informational conformity, independent of self-reported religiousness. Participants were primed through a lexical decision task (i.e., by categorizing combinations of letters as words or non-words); in the religious prime condition, religious words like ‘salvation’ or ‘prayer’ appeared for 15 ms followed by a mask between the presentation of the words and non-words. Conformity was measured by assigning participants a numeric task and presenting each participant three alternative answers to the numeric task that were given by other participants (informational influence). Results showed that participants primed with religion significantly conformed more than the other participants in choosing the correct answer to the numerical task (Van Cappellen et al., 2011).

The results of Van Cappellen et al. (2011) demonstrated that participants in the religious priming condition conformed, regardless of their religiousness, because of their knowledge of the religious primes utilized. The effect found in Van Cappellen et al. is in accord with Stark’s (1984) suggestion that studies investigating religious conformity would only be successful if the sample

population is religious. In cultures with a dominant religious worldview, religious ideas are heightened and become a valid aspect of normal interaction. This makes Nigeria an ideal location to carry out the experiments in the present thesis, as all popular forms of media are awash with religious doctrine; religion is reflected in conversations and symbolism (e.g., company logos, billboards, car stickers, etc.), and it is perpetuated in society by leaders, political and otherwise. This creates an ideal environment for informational conformity, given that the existential questions addressed by religion are ones that the average individual lacks competent information on. Most Christians in Nigeria attend places of worship most Sundays, in which expressions of religious emotions, intentions, and actions are readily and overtly displayed. Such expressions of religiosity saturate Nigerian society, in not only traditional church spaces but also other appropriated spaces such as hotels (Adeboye, 2012). Further, deviancy from religious norms is ridiculed and stigmatized (Bujra & Igwe, 2006), creating an ideal climate for normative conformity. The role of informational conformity in Nigeria will be considered in the first study carried out in the present thesis.

1.4.2 William James's Spiritual Self, Type I Cognitive Processes, and the Cognitive Science of Religion

William James's (1890) spiritual self is the most abstractly defined of all his classes of selves. James refers to the spiritual self as "… a man's inner or subjective being, his psychic faculties or dispositions…" (pp. 296). Despite the name 'spiritual self', this conceptualization of self is devoid of spirits/ghosts/religion per se, but rather stems from an intuitive inner core, or what James refers to as the "central nucleus of the Self" (pp. 298). A "rather mysterious operation" that we can only get a sense of where the sensory input facilitated by our psychic disposition ends and motor input begins.

These "psychic dispositions" of the spiritual self articulated by James (1890) may be what we now refer to as Type I cognitive processes, which are not open to conscious introspection but are autonomous, and go on to affect conscious Type II cognitive processes (Evans 1989, 2006, 2008; Wason & Evans, 1975; Stanovich, 2004). These dispositions that James referred to play a major role in

the contemporary Cognitive Science of Religion's (CSR) approach to the study of religion. According to CSR, a number of these dispositions, which are automatic and not necessarily open to conscious introspection, encourage and maintain the acquisition of religion (Barrett, 2000; Bering, 2000, 2004; Boyer, 1994, 1996, 2000; Guthrie, 1980, 1993; McCauley, 2000; Sperber, 1996). These dispositions are theorized to be enabled by specific cognitive mechanisms (e.g., the hyperactive agency detection device [HADD] Barrett, 2004). CSR will be explored extensively in the present thesis, under both the conceptual chapters and the last two empirical chapters.

In his treatment of the spiritual self, James (1890) also conceives of this "obscure" aspect of the self as the origin of "conclusions". Interestingly this foreshadows Mercier and Sperber's (2011a, 2011b) argumentation theory, which generally posits that reasoning (a conscious process) evolved to support conclusions generated by obscure unconscious processes. Mercier and Speber's argumentation theory will be expanded on in the conceptual chapters, particularly with regard to how it relates to the dual process theories and the weak massive modularity framework.

1.5 The Big Picture: Non-Conscious Effects of Religious Primes

Studies show that relevant symbols in one's immediate environment can prime individuals to act in predictable ways (Alter & Kwan, 2009; Aarts & Dijksterhuis, 2003; Bargh, 2006; Critcher & Gilovich, 2008; Gueguen, Bougeard-Delfosse, & Jacob, 2015). This priming influence often occurs beyond the conscious awareness of the individual through an autonomous association of already-connected constructs in memory (Bargh, 2006; Dijksterhuis & van Knippenberg, 1998). For instance, Bushman et al. (2007) showed that both religious US students (Study One) and non-religious Dutch students (Study Two) demonstrated increased aggression when primed with a punitive God. Gervais and Norenzayan (2012) showed that exposing Canadian participants to Rodin's sculpture *The Thinker* (a western secular symbol) increased religious disbelief. Most religiosity priming research, however, is undertaken outside Sub-Saharan Africa, creating a gap in the data from which we draw pan-human theories regarding the nature of religious and secular primes. In view of this gap, the

experiments in the present thesis were carried out in Nigeria, one of the most religious countries in Africa (WIN-Gallup, 2012), and assessed the situational influence of secular symbols and religious (benign and punitive) symbols on religiosity.

Abrahamic religions (i.e., Judaism, Christianity, and Islam) are doctrinal; they are characterized by high levels of repetition which leads to what Whitehouse (2005) terms the "tedium effect". The tedium effect occurs when over-familiarity with particular units of information leads to a deficiency in active conscious processing of those units, as a consequence of the high level of repetition. Stanovich (2004) terms these conscious-cum-nonconscious processes as the set of autonomous subsystems (TASS), while Smith and DeCoster (1999, 2000) terms them "functionally parallel neural networks". For instance, if narratives in Christianity and Islam about Hell as a place of punishment for sinners are repeated enough times, individuals would no longer need to consciously make the connection between sinners and Hell, but would do so effortlessly and nonconsciously. In priming studies, the prime (e.g., a symbol) only acts as a medium that is associated with already-learnt constructs stored in the memory of the individual. For instance, a symbol of Hell will have no effect on an individual who has never heard of narratives about Hell. Therefore, although the religious priming symbols are important in the experiments carried out in the present thesis, the highly religious nature of the culture in which the studies were carried out is even more important in guiding the predictions made.

Various studies on priming show that one does not necessarily need to hold a particular belief to be significantly influenced, rather what is necessary is an already-established knowledge of the construct to be primed (Bushman et al., 2007; Clobert & Saroglou, 2013; Labouff et al., 2012). For instance, Bushman et al. (2007) showed that priming a non-religious sample with a punitive God resulted in increased levels of aggression (Study Two), as it did with a religious sample (Study One). Clobert and Saroglou (2013) also showed that Belgian participants who were more familiar with Christianity were significantly more influenced by Buddhist symbolism to show increased prosociality, when compared to the control condition. A meta-analysis of the effects of religious

priming on prosociality (Shariff, Willard, Anderson, & Norenzayan, 2015) showed that in cultures where religious beliefs are prevalent, religious priming can significantly influence non-religious individuals.

The studies in the present thesis were carried out in two Nigerian states: the former capital Lagos, and the present capital Abuja.Although both states have large Christian and Muslim populations,their environmentsare filled with more Christian than Muslim symbols, especially symbols associated with media outlets (including billboards, TV, radio, and newspapers). The present thesis, as the title suggests, is particularly interested in the situational influences of these religious (vs. secular) symbols on religiosity in Nigeria.

CHAPTER 2

2. Literature Review

2.1 The Automaticity of Higher Mental States

Long before psychology became an independent discipline, Descartes (1637) proclaimed that humans are “merely automata” (i.e., *res extensa*) like all other animals; machine-like in functionality (e.g., use of nerves, veins, muscles, bones), distinguished from other animals only by the possession of a rational soul (i.e., *res cognitans*). A century later, this substance dualism distinction was diminished to a singularity view by more materially orientated philosophers, for instance La Mettrie's (1748) “automaton-theory” posited that man was merely a conscious automaton. The automaton theory informed the epiphenomenalism hypothesis which posits that physical events elicit mental states but mental states do not elicit physical events (Blackmore, 2010); this view reduces the soul/consciousness in Cartesian dualism to a minor epiphenomenal overflow of neural processes determined by the physical world (Capek, 1954).

The overbearing emphasis on the influence of situational/environmental cues on mental states was later championed by behaviourist theorists, such as Watson’s (1921) conditioned reflexes and Skinner’s (1938) proposition of stimulus control. These ideas were revealing but incomplete. The precedence of environmental influences over mental states soon lost its explanatory power in the wake of the cognitive revolution with propositions such as Chomsky’s (1971) argument for inherent cognitive mechanisms that directly support and influence physical events, such as the ability to acquire language. The cognitive revolution saw the re-emergence of the importance of the subjective qualities of conscious experience (Sperry, 1993). Contemporarily, unlike the unidirectional epiphenomenalism and behaviourist approach, determinants of mental states and subsequent behaviour are best viewed as bi-directional and interactive, between the physical environment and mental states (Popper, 1972). The present thesis conceives of automaticity as such, albeit with a greater emphasis on mental states as providing the vehicle through which social/cultural

constructs such as religion can operate (Barrett, 2004).

According to Bargh (2006), two studies were influential in establishing the contemporary study of the automaticity of higher mental states. The first was Cherry's (1953) exploration of the 'cocktail party effect'; this effect occurs when one is in a crowded and noisy environment, with all the different conversations blending into an incomprehensible dissonance, until one hears her name and her attention is automatically grabbed, with the once-incomprehensible words now becoming sensible. The second influential study was LaBerge and Samuel's (1974) proposition, which argued that when text is read, the words automatically activate corresponding semantic and lexical nodes in memory, and that this process is uncontrollable and effortless. More recent methodological approaches have been influenced by Bargh's (1982) and Devine's (1989) work on the automaticity of self-schema and stereotype representations, respectively.

Within cognitive psychology, the brain is generally conceived of as consisting of complex and interacting distributed networks (Barrett, Ochsner, & Gross, 2005). These networks are theorised to be composed of distributed neurons, called nodes, which hold units of information. In early frameworks, nodes were conceived of as singular "solutions" or outputs created to solve problems (e.g., Fogel et al., 1992). An improvement on this approach suggested that "solutions" or outputs are stored as connections between associated nodes. This connection is proposed to be flexible, i.e., able to accommodate changes in the pattern of the network, as well as able to be strengthened by experience or repetition (Ellenbogenn & Meiran, 2011; Hoffman & McGlashan, 1993).

Some frameworks propose that during cognition, nodes that are distinct but related to the subject of interest are integrated into a coherent entity and encoded in memory. With the different nodes thus connected, an activation of one node perhaps through perception, conversation, or reminiscence, facilitates the activation of the entire coherent entity with which that particular node is associated (e.g., Graf & Schacter, 1989; Mayes, Montaldi, & Migo 2007; Quamme, Yonelinas, & Norman 2007). This process is generally termed

‘spreading activation’ whereby the orthographical, lexical, and phonemically similar nodes are activated due to activation of an associated node (e.g., Ferguson et al., 2004; Posner & Snyder, 1975).

Spreading activation was first introduced by Quillian (1962, 1967) as a theory to understand semantic processing, and was modelled on computer simulations of comprehension and memory search. Quillian proposed that upon activation, during memory search, nodes in a semantic network would spread until a connection was formed. This idea was extended by Collins and Loftus (1975), with the proposition that units of information are represented as nodes within conceptual networks, and these nodes (within the conceptual network) are interconnected by means of parallel bidirectional links greater than links between those nodes and nodes in other semantic networks. Spreading activation has been explored to a large extent through the Lexical Decision Task (LDT), which measures the speed of classification of words (and non-words) after the presentation of a prime, where associated words are classified faster than non-associated words in the semantic network of the primed concept (Durgunoğlu & Neely, 1987; Fazio 2001; Schneider & Shiffrin, 1977). For instance, if a participant is primed with 'blood' either in its real or symbolic form, it is assumed that once the concept of 'blood' is activated it will spread to other nodes associated with blood in the memory of the participant (such as 'red' or 'pain'), therefore, if the participant is presented with the words 'red' or 'pain' he/she would respond to it quicker than responding to the non-word 'ced' or the word 'rain'. It is important to note however that although these associations are general they are also subjective; for instance, an individual recently injured (and bloodied) as a result of falling in the rain might associate 'blood' with 'rain' faster than the average individual would.

Not all researchers agree with the theory of spreading activation.As an alternative it has been argued that the activation of a node might invoke preparedness in the individual to facilitate response and/or competition (e.g., Klauer et al., 1997; Wentura, 1999). For instance, if a participant is primed with the word 'blood', it would facilitate response to the colour or word 'red' because the response pathway needed to respond to red has already been activated.

However, if the subsequent word (or non-word) is incongruent, such as 'ced', then activated associations with the word 'blood' must be inhibited before the individual can respond accurately. This effect is best illustrated with the stroop task. Despite these differences, however, it is clear that both frameworks agree that networks of nodes in memory can be influenced by the activation of one associated node.

A somewhat similar model of automaticity to the memory retrieval view is the algorithm-strengthening view; both views posit that conscious processes involve complex algorithmic computations.However unlike the memory retrieval model, which skips the computation stage to the output when the process is automatic, the algorithm-strengthening view posits that the complex algorithmic computation still takes place in automatic processing, albeit the process becomes much faster and seamless through repetition (Anderson 1992). Chartrand and Bargh (1999) use the analogy of playing a musical instrument to explain how (at least one kind of) automaticity might function. Musicians practice consciously, and upon getting better with practice, certain conscious and controlled cognitive processes (e.g., the spatial knowledge of the white and black keys on a piano) gradually become automated, freeing up conscious capacity to coordinate other creative processes. In sum, Chartrand and Bargh (1999) concluded that frequency and consistency were necessary and sufficient for automaticity, albeit under the same circumstances. Similarly, a review by Moors and Houwer (2006) on automaticity concluded that despite the conceptual and theoretical differences that distinguish the different studies they considered, all share the view that repetition fosters learning, which is evidenced by changes in accuracy, awareness, attention and speed, which are all features of automaticity. Bargh (1989, 1992, 1994) proposes that for any process to be termed “automatic” it ought to meet four criteria: (1) spontaneity, i.e., the ability to be triggered without conscious input; (2) uncontrollability, i.e., when triggered the ability to run to completion in the absence of conscious moderation; (3) minimal cognitive expense, i.e., use of minimal cognitive resources, and (4) unconsciousness, i.e., occurring beyond the awareness of the individual.

2.1.1 Type I and Type IIInformation Processing

There are a number of dual-process theories of information processing which vary according to underlying frameworks within different disciplines. For instance, dual-process theories can be found on reasoning (e.g., Evans 1989, 2006; Wason & Evans, 1975; Stanovich 2004), decision making (Wu et al., 2002), probability (Kahneman et al., 1982; Kahneman & Fredrick, 2002, 2005), processing of stereotypes (Bargh 1999; Devine 1989), self-knowledge (Nisbett & Wilson, 1977; Wilson, 2002), behavioural economics (Slovic, Finucane, Peters, & MacGregor, 2002), and decision making and management (Dhami & Thomson, 2012). Given the wide application of dual-process theories, theorists have utilised different terms for and attributed different levels of functionality to the two processes, making it difficult to coherently define either (Evans, 2008).

Automaticity is characteristically conceptualized as synonymous with automatic/non-conscious processes or Type I information processing and contrasted with controlled/conscious processes or Type II information processing (Evans, 2008; Greenberg, & Solomon, 1999; Kahneman & Frederick, 2002; Posner, 1980; Smith & Collins, 2009; Wason & Evans, 1975). Conscious or Type II information processing is considered as wilfully initiated, effortful, and controllable, whereas non-conscious or Type I information processing is considered as initiated beyond awareness, effortless, and autonomous (Evans, 2008). From an evolutionary perspective, the ability for Type I information processing has been theorised to be an early important evolutionary adaptation (Evans & Over 1996; Epstein & Pacini 1999; Reber 1993; Stanovich 1999). Type I processing would enable an immediate response to a recurring threat, for instance the innate and immediate aversion to snakes, where contemplation of alternate responses (Type II processing) might be prohibitively costly (Haslerud, 1938).

Recent research from social cognitive neuroscience has further identified specific systems in the brain that reflect the dual process framework. For instance, Liberman (2003) and Liberman et al. (2004), who describe these processes as ‘X’ (i.e., Type I) and ‘C’ (i.e., Type II), have shown that

implicit/automatic processes typical of Type I information processing are linked with the lateral temporal cortex, the basal ganglia, and the amygdala (X-system), while explicit/controlled learning, executive control, and inhibition typical of Type II information processing are linked with the medial-temporal lobe, prefrontal cortex, and the anterior hippocampus (C-system).

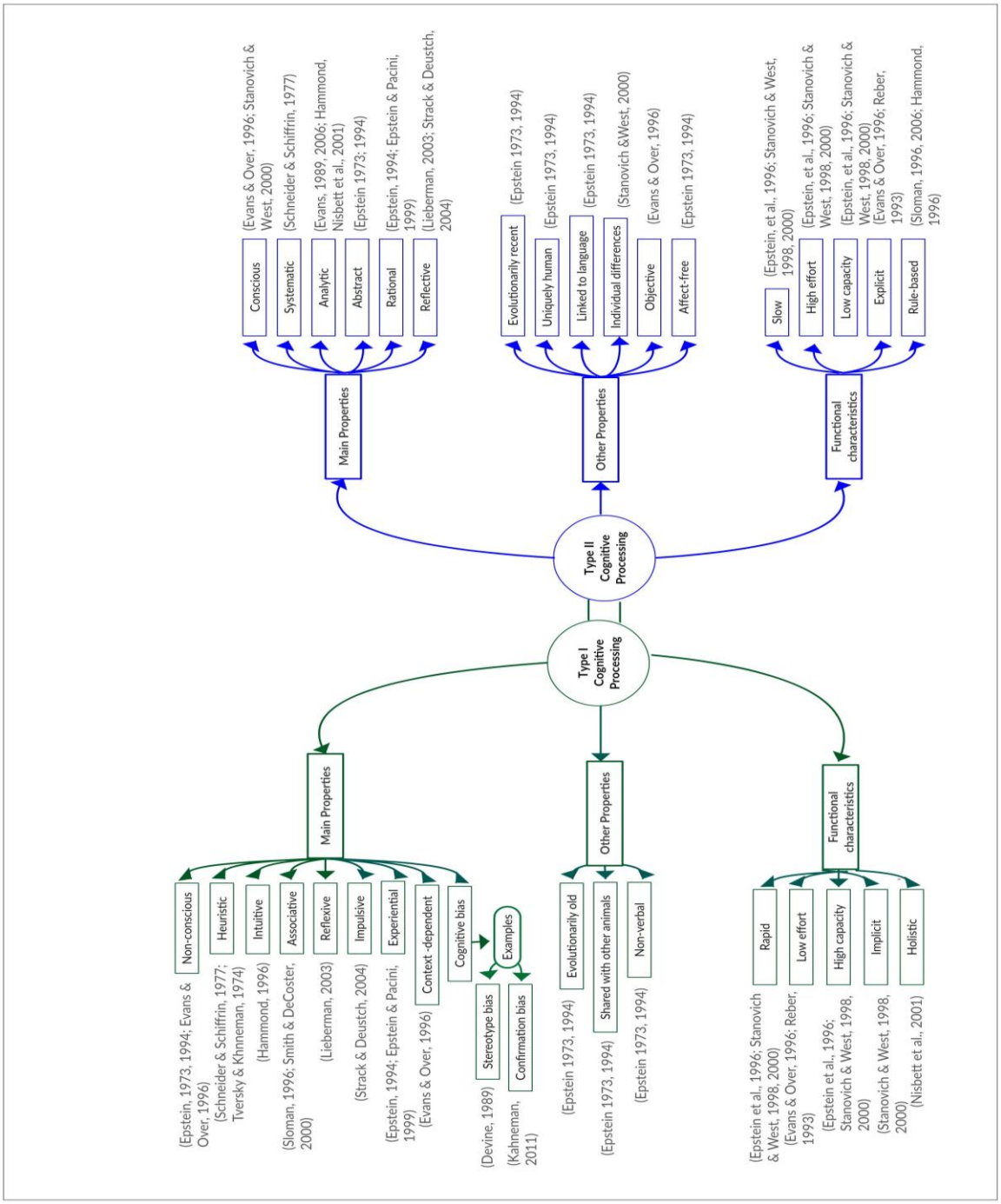

Figure 1.Properties and Functional Characteristics of Type I and Type II Processes

2.1.2 Type I and Type IIas Two Distinct Processes

Theoretical assumptions underlying cognitive psychology converge on the idea that information processing accounts for the response to stimuli in humans (Moors & De Houwer, 2006). It is further theorized that humans possess a limited cognitive capacity for information processing, insufficient to process the diverse range of sensory information that the brain receives (Wheeler & Treisman, 2002). For instance, Miller (1956) reported an observation from his study and several other studies carried out in the 1950s that humans can only hold about seven (±2) units of information within short-term memory at any given time (more recent research reports a smaller figure of four units [Cowan, 2001]). Consequently researchers highlighted the need for a mechanism that would select what aspects of information should be consciously processed at any given time (e.g., Allport, 1989; 1993). Early models of dual process theories considered 'attention' as the mechanism responsible for selecting the aspects of information to be processed, and consequently two types of information processing were conceived: one that is directed by attention or requires substantial attention (i.e., Type II), and another that functions independent of attention or requires minimal attention (i.e., Type I). Attentional networks according to these models orient sensory stimuli, activate information in memory, and maintain alertness (e.g., attention as an organ system [Posner, 1980, 2004], and attention as a triangular circuit (LaBerge & Samuels, 1974; LaBerge, 2004).

2.1.3 Type I and Type II as a Continuum

Similar to Broadbent (1958), who viewed the mechanism for attention as being active before perceptual analysis (as opposed to after semantic processing [e.g., Deutsch & Deutsch, 1963; see Moors & De Houwer, 2006]), Kahneman's (1973) capacity model of attention proposed that information processing does not depend on attention during the early stages (i.e., sensory processing). Kahnemen, however, further proposed that there is an increase in dependence on attention as information processing reaches the late stages (i.e., the response end). Building on Kahneman's proposition, Hasher and Zacks (1979)

proposed that attentional resources lie along a continuum for memory encoding, with automatic processes (i.e., Type I) at one end and effortful processes (i.e., Type II) at the other end. According to Hasher and Zacks, who were principally interested in how the encoding of information is processed, not how encoded information is processed, proposed that by virtue of the effortlessness of Type I, information is encoded in memory seamlessly because the cognitive system is not strained.However, because Type II information processing is effortful and strains the cognitive system, information is encoded in memory selectively.

Another example that viewsType I and Type II information processing along a continuum is Hammond's (1980, 1986, 1996) 'cognitive continuum theory', which asserts that intuitive reasoning (Type I) and analytical reasoning (Type II) have been presented as a false dichotomy, and argues instead that both processes should be viewed along a continuum. Hammond proposes that: (1) cognition can be viewed as a continuum with intuitive cognition at one end and analytic cognition at the other end, (2) common sense or 'quasirationality' includes instances of both intuitive cognition and analytic cognition, (3) cognition alternates between both ends of the continuum, where the stimulation of one end inhibits the other, and (4) the order in which cognitive tasks fall along the continuum is determined by their capacity to induce intuitive cognition, quasirational intuition, or analytical intuition.

2.1.4. Type I and Type II as Parallel-Competitive Interacting Processes

Evans (2008) has distinguished two broad categories of the conceptualisation of dual process theories according to how they function in interaction: 'parallel-competitive' and 'default-interventionist'. Within the parallel-competitive framework, Sloman (1996) proposes that Type I and Type II can simultaneously process different outputs for the same problem, Type I through an algorithm of association, similarity, and general knowledge (e.g., use of stereotypes), and Type II through an algorithm of hierarchy, logic and causal-mechanics. Sloman further proposes that the two processes provide different outputs because they have different goals, but that they overlap and the output is dependent on the individual (e.g., individual knowledge and experience). Another example of the

parallel-competitive framework is the cognitive-experiential self-theory (CEST; Epstein, Lipson, Holstein, & Huh, 1992), which differentiates a preconscious nonverbal experiential process (Type I) from a verbal reasoning rational process (Type II). An underlying assumption of CEST is that people automatically create an emotionally driven cognitive personal theory of reality, comprised of a self-theory, a world theory, and connecting prepositions; and this automatic personaltheory of reality is carried out by the Type I experiential system. Like Sloman, CEST proposes that the experiential system and the rational system function in parallel and can interact with each other. However, unlike Sloman, CEST proposes that because Type I cognitive processing (i.e., here the experiential system) is evolutionarily older and laden with emotion, it can overrideType II cognitive processing (i.e., the rational system) even when people are aware that their actions might be perceived as irrational (Denes-Raj & Epstein, 1994; Epstein et al., 1992; Kirkpatrick & Epstein, 1992).

Epstein, Pacini, Denes-Raj, and Heier (1996) showed that belief in unusual and superstitious thinking is correlated with the experiential system through the use of the constructive thinking inventory (Study One). Pacini and Epstein (1999) used factor analysis to show that religious orthodoxy (measured as conservative ideology) was inversely associated with rationality and not with the experiential system (Study One). Epstein (1994) emphasises that religion in general is ubiquitous among humans because religion communicates better with the experiential system than the analytical system, and because the experiential system is the default mode of cognition. More recently, Norris and Epstein (2011) showed that the experiential system is divided into three factors: intuition, imagination, and emotionality, while the rational system is comprised of a single factor.

2.1.5 Type I and as Default-InterventionistInteractingProcesses

The default-interventionist framework, unlike the parallel-competitive framework, generally proposes that initial outputs generated by Type I processes influence and constrain Type II processes, which act upon the outputs generated byType I processing (Kahneman & Frederick, 2002, 2005; Stanovich 1999, 2004,

Stanovich & West, 2008). Within this framework, strategies, procedures, and rules acquired by Type II termed 'mindware' (Pekins, 1995) are used to replace heuristic outputs provided by Type I (Stanovich & West, 2008). It then follows that acquisition of the necessary mindware for the particular context is a prerequisite for the proposed intervention by Type II. For instance, attributing rainfall to a supernatural agent might be the final output, initially processed intuitively by an individual'sType I, and rationalized by her Type II's cognizance of the cultural/religious narrative (e.g., supernatural agent X is responsible and not supernatural agent Y). If the individual'sType II, however, has the necessary mindware to know that rainfall is water from the clouds, condensing after it has cooled to its dew point or as a result of increased water-to-air ratio,then her response will be different.

Kahneman and Frederick (2002, 2005) propose that after Type I has rapidly produced intuitive outputs to a particular problem, Type II may or may not override, correct, or endorse it. Stanovich (2009, 2011) in the heuristic-analytic theory of reasoning, further proposes that the intervention on Type I by Type II and the production of alternative output/s are two different processes, therefore Type II operates on two different levels termed 'algorithmic level' and 'reflective level'. Stanovich, West, and Toplak (2011) propose that the algorithmic level accesses strategies utilized for cognitive processes and the production of rules for sequencing thought and behaviour. Hence, when Type II overrides Type I through the algorithm level it does so through altering the particular cognitive strategy and rules in question. They further propose that the reflective level accesses acquired beliefs, goals, and opinions to produce alternate outputs when Type II overrides Type I through the reflective level.

2.2 Religiosity, Rationality, and Cognitive Dual Processing

"A great deal of intelligence can be invested in ignorance when the need for illusion is deep."
Saul Bellow [1976, p.127]

The quote above by the Nobel Laureate Saul Bellow echoes the argument in

the present section regarding the relationshipbetween rationality and religion. Psychological studies as early as Howels (1928) and Sinclair (1930) reported negative correlations between religiosity and intelligence. These negative correlations characterized most religiosity vs. intelligence studies of the period, for a review see Argyle (1958). This generalization however was challenged by Kosa et al. (1961), with the hypothesis that the social environment of the individual (religious or secular) will determine the relationship between mental abilities such as intelligence and religiosity. Recently, owing to the proliferation of dual-process theories of cognition, there has been renewed interest in the relationship between cognitive ability and religion (Aarnio & Lindeman, 2007; Buzdar, Ali, & Tariq, 2015; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2013; Shenhav, Rand, & Greene, 2012; Siddiqa, 2010).

As discussed in the previous section, dual-process theories of cognition generally distinguish heuristic/reflexive/experiential/intuitive (hence fast and automatic) Type I cognitive processes from analytical/reflective/rule-based (hence slow and controlled) Type II cognitive processes (Evans, 1989; 2006; Kahneman, Slovic, & Tversky, 1982; Stanovich & West, 2000; Stanovich, West, & Toplak, 2011). Based on this distinction, studies have re-emerged linking religious belief with irrationality and/or lack of an analytic cognitive style (Pennycook et al., 2012, 2013; Shenhav, Rand, & Greene, 2012). The present thesis, however, proposes that religious belief need not be viewed as synonymous with Type I cognitive processing, and hence as irrational, but that religious belief can also entail rational thought (i.e., through Type II cognitive processing) used to justify the initial inferences and conclusions generated by Type I cognitive processing. This approach to the rationality vs. religion debate is grounded within the default-interventionist dual-process framework (Evans, 2007; Evans & Stanovich, 2013a), which advances that Type II cognitive processes are influenced and can be constrained by inferences and conclusions generated by default Type I cognitive processes. This approach is consistent with the argumentative theory (Mercier & Sperber, 2011a, 2011b; Mercier, 2011a, 2011b, 2011c, 2011d), which proposes that reason (Type II cognitive processing) evolved for supporting conclusions generated by Type I

cognitive processes. It is also consistent with Baumard and Boyer's (2013) modified dual-process model, which proposes that religious beliefs are reflective elaborations on initial intuitions.

Reflective/analytical/rational thought has been identified as a distinct thinking style associated with low religious belief (Aarnio & Lindeman, 2007; Pennycook et al., 2012, 2013; Shenhav et al., 2012; Musch & Ehrenberg, 2002). Aarnio and Lindeman (2007) distinguish between an intuitive thinking style (typical of Type I processing) and an analytical thinking style (typical of Type II processing), suggesting that the former supports religious belief because of its dependence on self-evidently valid subjective experiences. Pennycook et al. (2012) similarly showed a negative relationship between religious belief and an analytic cognitive style, and a positive relationship between religious belief and an intuitive thinking style. Pennycook et al. (2012) offer an asymmetric model of belief and unbelief that proposes the emergence of religious scepticism after initial acceptance (of religious belief) in rational individuals. This line of reasoning is further advanced in the proposal of a conflict detection mechanism that detects conflicts in reasoning about belief and reasoning about the material world (Pennycook et al., 2013). Shenhav, Rand, and Green, utilizing the Cognitive Response Test (CRT), which generally assesses the tendency for a reflective or intuitive response in individuals, showed that an intuitive cognitive style predicts religious belief (Study Two A), and this relationship holds even when personality and cognitive ability are controlled for (Study Two B).

The cognitive experiential self-theory (CEST; Epstein, 1985) though originally conceived as a triadic model, has been utilized as a parallel functioning but interactive dual-system framework to explain the relationship between rational thought and religious belief. According to CEST, individuals automatically create and connect propositions of a self-theory and a world-theory, which combine to form an emotionally driven cognitive personal theory of reality (Epstein, 1985; 2003; Epstein, Pacini, Denes-Raj, & Heier, 1996; Norris & Epstein, 2011). Two conceptual systems within CEST include the experiential system and the rational system; the former is typical of Type I processing (i.e., intuitive and automatic), while the latter is typical of Type II processing (i.e., reflective and

controlled). Within CEST, emphasis is placed on the experiential system, theorised to be evolutionarily older than the rational system, and responsible for encoding, organizing and interpreting experience, as well as directing behaviour (Epstein et al., 1996).

The experiential cognitive system is theorized to be dependent on associative and observational learning and aided by reinforcement, to employ crude broad generalizations, and to be affective, and it is claimed to be "self-evidently valid" (Norris & Epstein, 2011). The experiential system is also theorised to be associated with naïve optimism and superstitious belief (Epstein et al., 1996; Watson, Morris, Hood, Miller, & Waddell, 1999). Although several studies have reported positive relationships between religiosity and the experiential cognitive system, most of these studies consist of population samples from nations that Henrich, Heine, and Norenzayan (2010) have termed Western, Educated, Industrialized, Rich, and Democratic (WEIRD). The conclusions drawn from studies on religious belief and rational thought carried out in WEIRD nations might not apply to non-WEIRD nations, particularly those without a conspicuous secular worldview. For instance, recently, Buzdar, Ali, and Tariq (2015) showed that in Pakistani secondary school students, Muslim, Hindu, and Christian participants scored higher on rational cognitive processing than experiential cognitive processing, with Muslims showing the highest signs of rational processing, and Christians showing the highest signs of experiential processing. The positive relationship between high rational thought and Islam in the Buzdar et al. study, however, is in contrast to Siddiqa (2010) which found an inverse relationship between Islam and rationality among Pakistani university students.

The default-interventionist dual-process framework employs the general distinctions between Type I and Type II cognitive processing. However, Type I cognitive processes are theorized to be the default mode of cognition that generates inferences and conclusions which influence and can constrain Type II cognitive processes (Evans, 2007; Evans & Stanovich, 2013a). This implies that in instances where Type I cognitive processes generate religious inferences and conclusions, Type II cognitive processes can rationalize these inferences and conclusions to generate a coherent output. Hence the process (i.e.,

rationalization) is differentiated from the content (i.e., religious inferences and conclusions). The extent to which Type II cognitive processes might wholly rely on, partially rely on, or completely override Type I generated references and conclusions is based on individual differences and situational contexts (Evans & Stanovich, 2013b).

Baumard and Boyer's (2013) example, presented below, is characteristic of the default-interventionist dual-process approach to rationality and religion. It is theorised that synchronised movement simulates endorphin production (Cohen, Ejsmond-Frey, Knight, & Dunbar, 2010), which would be an automatic Type I cognitive process. When the synchronised event is religious (e.g., prayer), Type II cognitive processes might rationalize the feeling caused by the Type I cognitive processes (i.e., endorphin surge) with available knowledge (e.g., as a consequence of supernatural agency). The argumentation as a function of reasoning hypothesis (Mercier & Sperber, 2011a) equally sheds more light on Baumard and Boyer's example. According to Mercier and Sperber, reason (i.e., Type II cognitive processing) evolved for supporting conclusions generated by Type I cognitive processes, and serves an adaptive goal of social persuasion. Building on Evans (2007), Evans and Stanovich (2013a), Mercier and Sperber, as well as Baumard and Boyer, it can be argued that religious belief does not necessarily imply the absence of rational thought. Rational religious individuals in societies with a dominant religious worldview and no conspicuous secular worldview might utilize Type II cognitive processes toward rationalizing and justifying religious inferences and conclusions generated by default Type I cognitive processes. This specific hypothesis was tested in the present thesis, across Study Two (laboratory setting) and Study Three (real-life setting).

2.3 Religiosity, Rationality, and Conformity

The previous section provided a signpost to the conceptual approach to Studies Two and Three in the present thesis. However, the dual process approach to the rationality vs. religion debate does not exhaust all the explanatory variables. The present section offers a philosophical and social approach as opposed to the cognitive approach of the previous section.

Religious thinking has been described as irrational (Culver & Gert, 1982; Gervais, Shariff & Norenzayan, 2011; Laythe et al. 2002; Alarcón, Moreno-Jiménez, & Moral-Toranzo, 2011). Some researchers, Dein and Littlewwod (2011) for instance, have even suggested that religion and psychosis have a common evolutionary trajectory, referring to their commonalities (as well as differences) in the perception of supernatural agencies, delusions, withdrawal, broadcasting, and thought insertion. Rationality, however, is multifaceted, and a more critical assessment of the rationality or irrationality of religion will have to specify exactly what kind of irrationality is being referred to. For the purpose of the present thesis, epistemological rationality, as well as Scherer's (1985, 2011) categorical distinction of rationality into functional, consensual, and inferential rationality will be briefly considered, in relation to conformity.

2.3.1 Epistemological Rationality and Conformity

Epistemic rationality generally refers to a subjective mode of reasoning, fostered by one's beliefs as supported by one's evidence of those beliefs (Kelly 2003). For instance, in response to the question "Are natural disasters an act of God to punish sinful nations?" a Christian believer might gather 'evidence' for this, such as the destruction of Sodom and Gomorrah (Genesis 19:24, KJV) or the flooding of the world when Noah was six hundred years old (Genesis 6 – 7, KJV). The believer might have also gathered evidence through personal events, such as loss or death of a 'sinful' loved one or acquaintance. One might therefore argue that a Christian who asserts that natural disasters are an act of God to punish sinful nations has come to that conclusion rationally, albeit epistemologically. The evidence supplied in the example above, however, is illogical. For instance, Noah lived in the Middle East and it is improbable that he could have gathered species found only in the Australian outback or Amazon forest. Further, even if his genius had allowed him to gather both predator and prey in an ark for 40 nights, it would have been physically impossible to fit all species in the world into an ark sized 300 x 50 x 30 cubits (Genesis 6:15).

From the above paragraph, we can philosophize how one might conceive of an illogical and improbable conclusion as epistemologically rational. However, how

does one's social environment affect subjective epistemology, particularly in the research setting of the present thesis? Luyaluka (2016) argues that contrary to Western epistemology, African epistemology attributes the source of all things to God. Luyaluka, in this particular work, fails to appreciate the complexity of the history of Western epistemology, particularly of the religiosity-influenced pre-enlightenment era. Nonetheless, his thesis on the epistemology of the (present) African mind is adept; the assumption that everything emanates from God is the norm. Therefore, in this particular case the subjective epistemology of the religious African individual is in accord with the social epistemology of his environment, creating the ideal context for both normative and informational conformity.

2.3.2 Functional Rationality and Conformity

Functional rationality serves a Machiavellian end. It is similar to Weber's (1964) *Zweckrationalität*, and is more generally known as instrumental rationality; it is reasoning fostered by one's anticipation of an intended outcome, and can be thought of as "self-interested calculation" (Meglino & Korsgaard, 2006). If one does indeed believe in God and Satan, and in Heaven and Hell, then adopting mental states and behaviour that serve to meet the ultimate goal of attaining Heaven (or avoiding Hell) is functionally/instrumentally rational.

Functional rationality is relevant to both normative conformity and informational conformity. As discussed in Chapter 1.4.1, normative conformity occurs when individuals alter their behaviour to obtain and/or maintain group desirability (Lonnqvist et al., 2009; Navarrete, Hall, & Fessler, 2005), and to avoid social disproval (Cialdini & Goldstein, 2004). Pretending to be religious (or according to James's [1890] social self, showing one's religious self) within a society that places a high value on religiosity is rational, when viewed through the lens of functional rationality. Informational conformity occurs when individuals alter their behaviour due to a desire for accuracy (Lonnqvist et al., 2009). Therefore, in a highly religious society, such as the one in which the empirical studies of the present thesis were carried out, an individual who lacks information on religion (no one is born with knowledge of any religion) can be viewed as functionally

rational, if he becomes religious due to the pro-religious information available.

2.3.3 Consensual Rationality and Conformity

Consensual rationality generally refers to the appeal to common sense in relation to social desirability, where going against the group norm would appear undesirable (Scherer, 1985; 2011). Consensual rationality is similar to what Weber (1964) termed value-based rationality or *Wertrationalität,* and has all the hallmarks of normative conformity;it is, however, reasoned out or *rationalized conformity*. Therefore in a non-secular culture such as Nigeria, it is easy to see how a believer might rationalize an illogical belief or behaviour when it is religiosity-related. For instance, the statement "Accepting the events in your life by religious faith is better than reasoning out the causes of the events" can be very dangerous, if one is persuaded by it. One infected with malaria could, instead of seeking a doctor, depend on his/her religious faith which asserts that God is the author of all things, and that therefore He alone can heal. That individual would engage in prayer and fasting rather than seek medication, and would not dare doubt the efficacy of prayer to God, nor the morality of God for infecting her and many others in the first place. The religious consensus would regard such doubt as a sure path to Hell, as Christian indoctrination asserts that scepticism is sinful (Matthew, 5:28, KJV).

2.3.4 Inferential Rationality and Conformity

Inferential rationality is analytical and lays emphasis on logical conclusive arguments (Scherer, 1985, 2011). Inferential rationality meets the three criteria of the modernist conceptualization of rationality, i.e. it must (1) be universally valid, (2) have clear associations among different components of relevant arguments, and (3) be determined by specific logical rules (van Huyssteen, 1999). Scharp (2013) adds that inferential rationality also encompasses the motivation to re-evaluate pre-existing beliefs based on new evidence. Although inferential rationality is more valuable for objective intellectual pursuit than the other forms of rationality considered above, it is not without its flaws. An inferential rational argument necessarily requires an initial premise from which

rational points are inferred, and this chain of inferences is not infinite but regresses to the point at which the premise is conceded (Rescher, 1998).

When sceptics write that religiosity is irrational they mostly refer to inferential rationality, and when religious-apologetics reply that religion is rational they mostly refer to the other facets of rationality discussed earlier, or to related facets. One must also ask the question, what is the relationship between inferential rationality and conformity? To respond to this question, one must ask an even greater question, i.e., what is the social context? It might be stated that in as much as one conforms, the process cannot be said to be inferentially rational even if the end result might coincidentally be (e.g., in a gathering of sceptic professors). This argument, however intuitive, is not robust, for it can also be argued that an individual, for instance, due to informational conformity pressure, can also alter his/her behaviour by thinking through the problem inferentially and arriving at the same conclusion. In response to the greater question asked earlier (i.e., what is the social context), the society where the empirical studies were carried out is not composed of sceptic professors, but predominantly made up of very religious individuals. All religions based on metaphysical and mystic claims (such as resurrections [John, 11: 44, KJV; Matthew, 28:6, KJV] and a man living inside a fish for three days [Jonah, 1:17, KJV] in Christianity) cannot be considered to be based on inferential rationality.

CHAPTER 3

3. The Cognitive Science of Religion's Approach to Religion

Contrary to the now-confusing terms 'system one' and 'system two', originally conceived by Stanovich (1999) to generalise the different dual process/system frameworks and offer some clarity, cognitive processing is not limited to two systems but better viewed as a collection of systems, subsystems, and specific mechanisms which function through Type I and/or Type II cognitive processing (Baumard & Boyer, 2013; Eraña, 2011; Evans & Stanovich, 2013). To regard system one processes as responsible for religiosity, and system two processes as responsible for scepticism toward religiosity, seems insufficient, particularly in individuals who have rational motives (e.g., epistemologically) to be religious. The default-interventionist framework offers more explanatory power for the relationship between religiosity and Type I and Type II cognitive processing. According to the default-interventionist framework, Type I processing generates a set of inferences which Type II processing might or might not rationalize, depending on the individual processing the information and the context in which the information is processed. The series of experiments carried out in the present thesis addresses the latter (i.e., situational context). This approach, however, will be insufficient without a critical examination of the former (i.e., the individual) and a critical look beyond the vague terms Type I and Type II, to identify specific cognitive mechanismsthat function through these processes.

The modularity of the mind framework generally advances that the mind is comprised of specialized modules that perform domain-specific functions, as shaped by natural selection (Bechtel, 2002; Carruthers, 2005; Cosmides & Tooby, 1992; Fodor, 1983; 2000). This appears in contradiction to the dual theories of cognition, for either the mind is made up of two systems (the dual framework) or many modules (the plurality framework). However, in line with Eraña's (2011) argument, this conflict only arises in two instances. The first instance is when the dual process approach is conceived of as architectonic (i.e., two different cognitive systems), as opposed to when it is conceived of as descriptive (i.e., of cognitive processes, not systems). The second instance is

when modularity is conceived of in the strong encapsulated view of Fodor (1983), which posits that modular cognitive systems are impenetrable, domain specific, innate, and informationally encapsulated. Modular systems according to Fodor should satisfy the following nine criteria: they should be localized, subject to characteristic breakdowns, autonomous, fast, productive of simplistic outputs, ontogenetically determined, domain specific, impenetrable, and informationally encapsulated.

Conceiving the mind as composed of modules has been particularly favoured within evolutionary psychology. For instance, Cosmides and Tooby (1992) articulate that general-purpose, content-free systems will be unlikely to evolve because the reproduction of these systems will be problematic and easily outcompeted. The strong view of massive modularity has come under much criticism, even from Fodor (2000), because of its restrictive nature in explaining high level cognition. Carruthers (2006, 2008) argues that modules need not necessarily be encapsulated but frugal. Carruthers advances that impenetrable and informational encapsulation will lead to duplication which might result in bigger, costlier brains. Barrett and Kurzban (2006) offer a less restrictive view of modules, arguing that they should be viewed according to their functional specialization, i.e., modules will differ and be constrained according to the particular action they have evolved to execute on the particular information they are programmed to receive.

Carruthers (2006, 2008) offers a weak massive modular framework compatible with the cognitive dual-processing hypothesis. Carruthers proposes that Type I cognitive processes will include the set of central modules that generate inferences for goal-formation, belief-formation, and decision making, while Type II cognitive processes will include cycles of rehearsed and serially processed inferences from Type I. Examples of Type II cycles of rehearsed inferences include religious doctrine and rationalized faith. Carruthers (2006) emphasizes the relevance of a central language module which receives information from different domain specific modules that it translates into natural sentences and integrates through an inference generator. Also central to Carruther's (2006) hypothesis is the role of mental rehearsal of these inferences, generated either

through inner speech or visual imagery. Carruthers posits that these set of inferences are 'globally broadcast' as theorized by Baars (1988, 1997), directed by normative beliefs and influenced by verbal instruction. Further, this integration extends beyond similar semantic content, for instance, metaphors can forge an integration through language between weakly associated concepts, that otherwise would have never been integrated, and when thus integrated can generate further inferences, which are strengthened through rehearsal.

Carruthers's proposition has been welcomed by some dual process theorists, for instance, Evans (2003) and Evans and Over (2008). Prominent dual-process theorists agree that because Type I processes are autonomous and numerous, there is good reason to conceive of them as modular. Evans and Over, however, have criticised Carruthers' emphasis on the role of language for the integration of Type I processes, or modules, suggesting that language need not be the only integrating system. Mercier and Sperber (2011a, 2011b) and Mercier (2011a, 2011b, 2011c, 2011d) advance a similar hypothesis, which highlights some similarities between the weak massive modularity framework and the dual process framework, albeit through a different theoretical approach. Mercier and Sperber hypothesize that argumentation is the function of reasoning (a Type II process), and has evolved to justify conclusions generated intuitively (by Type I processes). Mercier and Sperber reference empirical research which shows that reasoning can often lead to epistemic distortions that are at odds with what is factual, given that individuals tend to reason backwards by seeking reasons to justify their conclusion. Mercier and Sperber cite confirmation bias (i.e., the search for/interpretation of evidence to endorse pre-existing beliefs/expectations) as a quintessential example, which is ubiquitous, regardless of open mindedness or general intelligence (Stanovich and West, 2007, 2008).

Although not explicitly stated by Mercier and Sperber (2011a, 2011b; Mercier, 2011a, 2011b, 2011c, 2011d), their approach falls within the default-interventionist framework of dual process theories, i.e., Type I processes generate a set of inferences that Type II processes act upon and are

constrained by. Within Mercier and Sperber's approach toward reasoning in particular, Type I processes generate a set of inferences and consequently a conclusion, or set of conclusions, which Type II processes seek to justify; Type II processes are thereby constrained by the conclusion/s generated by Type I processes. As pointed out by Frankish (2011), Mercier and Sperber's hypothesis also throws light on an error that seems implicit within dual process/systems theories, particularly when non-experts utilize it. This error occurs when non-experts synonymise Type II processes with factual, objective, and error-free conclusions, and Type I processes with error-prone conclusions. As Mercier and Sperber's hypothesis informs, thought-out justifications for pre-existing beliefs need not necessarily be objective and factual, and the default-interventionist framework offers much more explanatory power than frameworks which conclude that religion is supported by Type I and not Type II (e.g., Pennycook et al., 2012).

In addition to Frankish (1998, 2004), Carruthers's (2006) work on articulating how the weak massive modularity approach might gain better explanatory power by engaging with dual process theories has been accepted as well as criticized. Consequently, Curruthers (2008) has sought to clarify the most criticized aspect of his hypothesis (i.e., his emphasis on language as an integrator of inferences from domain specific modules [e.g., Evans & Over, 2008]). Curruthers (2008) addresses this criticism by suggesting that language is not the only means through which content is integrated from different modules, and that when language is absent the integration of modules will depend upon and be constrained by "contingent patterns of module connectivity" (pp. 296). Given the lack of theoretical clarity in the conception of a singular Type II cognitive process (i.e., language), it is argued that Type II, just like Type I, may be composed of multiple mechanisms (Evans & Over, 2008; Mercier & Sperber, 2011a), e.g., different mechanisms required for strategic planning, probabilistic reasoning and creative imagination.

The subchapters presented below address Type I and Type II processes and mechanisms specifically related to religion. In line with the cognitive science of religion (CSR), the tertiary impact of signs on cognition will depend on primary

ubiquitous cognitive mechanisms/processes and secondary socio-cultural acquired links between the signifier (e.g., the crucifix) and the signified (e.g., resurrection in Christianity).

3.1 Agency Detection

Before considering the mechanism theorised to be responsible for the cognitive process of agency detection, it will be necessary to briefly discuss Error Management Theory (EMT; Haselton, Buss, & DeKay, 1998; Haselton & Buss, 2000). Expanding on Green and Swet's (1966) work on signal detection, and heuristic based systematic errors in judgement and reasoning (e.g., Tversky & Kahneman, 1974), Haselton and colleagues propose that cognitive errors present in human reasoning today arise from *adaptive biases* formed in the Environments of Evolutionary Adaptedness (EEA) because they offered reproductive and survival advantages (emphasis in original). EMT, like signal detection, advances that two general types of errors (Type I errors and Type II errors) are possible when judgements are made under uncertainty. Crucially, a decision maker cannot optimize the decrease of both errors simultaneously because the decrease in tendency of either increases the tendency of the other. For instance, one cannot decide on a dark night that a string-like object on the floor is a snake and a rope to the same degree; the tendency to decide the string-like object is a snake will decrease the tendency to decide the string-like object is a rope, and vice versa. Further, if deciding between a snake and a rope was a recurrent problem in the EEA then, selection would have fashioned adaptations to make predictable errors, such as a bias to assume that the string-like object is a snake (i.e., to err on the less costly side, where mistaking a rope for a snake would be less costly than mistaking a snake for a rope). EMT accounts for this type of reasoning by positing a trade-off in costs. For instance, making a Type II error by wrongly perceiving a rope to be a snake will cost the individual cognitive resources in terms of heightened emotion and caution, due to the false alarm. This however would be less costly than a Type I error where the individual wrongly perceives a snake to be a rope; this error would save cognitive resources but would cost the individual more, possibly her life.

The CSR pioneer Guthrie (1993), in his work *Faces in the Clouds,* proposed the existence of a cognitive agency detection device (ADD) that serves a general perceptual function which leads to the acquisition of religion (as a by-product), particularly when perceptual hypersensitivity results in anthropomorphic tendencies. Bering (2000, 2004) further proposed that ADD is a hyperactive, non-reflective specific cognitive mechanism that is prone to identifying agency even when none exists, particularly in uncertain, ambiguous, and threatening situations. Barrett's hyperactive agency detection device (HADD) has gained more popular appeal than Guthrie's original ADD but both Guthrie and Barrett agree that an ability to infer agency even when it does not exist would have offered a survival advantage, for instance aiding in the detection of camouflaged or otherwise hidden predators (e.g., snakes, big cats).

As outlined earlier, EMT (like signal detection) advances that in uncertain situations two types of errors are possible (Type I error and Type II error), and that the decrease in one type of error will necessarily lead to the increase in the other type. Further, if the cost of the errors were asymmetrical in the EEA then cognitive biases that make the less costly error will be selected for. HADD is an oversensitivity bias that makes a less costly error (Barrett 2002, 2004; van Elk, 2013). For instance, in an uncertain situation, possibly in the dark, when the bushes beside one rustle, there might be two possible explanations: either an agent or the wind caused the rustle. As EMT informs us, in such an uncertain situation, one will be biased towards assuming that a potentially dangerous agent, rather than the wind, caused the rustle. According to the theory behind Type I processes, this process will be autonomous (i.e., one doesn't decide to decide it is an agent). The assumption that the rustle was caused by an agent will be less costly in the long run than the assumption that the rustle was caused by the wind; if the former turns out to be correct, one will be prepared for appropriate action (e.g. to run away from a potential predator).

Barrett (2004) proposed that state anxiety produced by the presence of threat (e.g., a predator in the ancestral environment) and the ambiguity of sensory input (e.g., hearing sounds in the dark) will heighten the sensitivity of the

threshold for the detection of agency. Barnes and Gibson (2013) evaluated the effect of these environmental factors by asking participants to rate the presence of four environmental variables (nonthreatening-threatening, busy-secluded, light-dark, noisy-secluded) at the time of their most memorable spiritual, religious, supernatural or paranormal (SRSP) experience on a seven point scale. The results showed that (only when) the four environmental variables were factored together was there a significant difference between rating an SRSP experience as involving a religious supernatural agency as opposed to a nonreligious supernatural agency, with nonreligious supernatural agency more likely to occur when it is dark, quiet, secluded, and threatening. Additionally, participants who recalled supernatural agency that was nonreligious had higher scores on magical ideation (a schizotypy measure).

In a more direct measure of agency detection, van Elk (2013) utilized a biological motion perception task to estimate group differences in agency detection between paranormal believers (who were recruited from the *Paraview* paranormal fair in Amsterdam) and sceptics (who were recruited from the University of Amsterdam). In the biological motion detection task, participants viewed a series of point-light displays and had to decide if they detected the presence of a human agent or not. The results showed that only paranormal belief (e.g., superstition and precognition), and not belief in witchcraft or traditional religion, was related to illusory agency detection. The results further showed that participants who believed in the paranormal showed a significantly greater bias toward illusory agency detection than sceptics, but only when there was low to intermediate ambiguity in the biological motion detection task, and not when there was high ambiguity. Van Elk discussed his results in terms of paranormal believers showing a greater tendency for confirmation bias and rushing to conclusions based on insufficient evidence. Agency detection will be revisited, after a look at other cognitive processes that function in conjunction with it in the acquisition and maintenance of religion.

3.2 Theory of Mind

Premack and Woodruff (1978) are often credited with the first use of the term Theory of Mind (ToM) in psychology (e.g., Schlinger, 2009), in a study that investigated if chimpanzees possess this feature that is universal in all normally-developing humans. The use of the term 'Theory of Mind', however, dates further back, for instance Patrick (1922) used it within philosophy to describe the mind as an emergent property of the body. Premack and Woodruff proposed that ToM is the mental state an individual imputes to himself about himself, conspecifics, and other species. Premack and Woodruff considered it appropriate to call this phenomenon a theory because the process and the set of inferences generated are not directly observable, and because predictions can be made based on the set of inferences generated. Since then, ToM has generated considerable interest; Salzinger (2006) reported 2,176 entries for ToM in PsycINFO, and presently (2015) PsycINFO contains 18,471 entries. Recent papers have expanded on the conceptualisation of ToM, however the basic idea put forward by Premack and Woodruff still applies. For instance, Malle (2002) considers ToM as the ability for mental states to be represented, conceptualized, and reasoned about, while Baron-Cohen (2001) emphasizes that these mental states include the full range of beliefs, emotions, imagination, intention, and desires.

ToM amalgamates Simulation Theory (ST), Theory Theory (TT), and their derivatives (Bohl & van den Bos, 2012). TT has many variants, most however generally agree that intuitive conceptual hierarchical structures involving causal representations of the world that enable predictions of future events are similar to mundane theories that get updated in light of new evidence (Carey, 1985; Gopnik, 1988; Wellman & Gelman, 1992). Of the variants of TT, one prominent point of departure is between theorists who argue that intuitive conceptual hierarchical structures are learned (e.g., Gopnik and Meltzoff, 1997), and theorists who argue that these intuitive conceptual hierarchical structures are innate (e.g., Baron-Cohen, Leslie, & Frith, 1985). Contrary to TT, ST asserts that individuals utilize their own minds as models to simulate what other minds might be like; this might be done through imagination (Goldman, 1989) or through

implicit or explicit reasoning (Gallese & Goldman, 1998). Recently, Goldman (2006) has argued in favour of combining explicit and implicit ST frameworks as well as the TT framework, to gain more explanatory power and overcome criticisms levelled against each which are addressed by the other.

Bohl and van den Bos (2012) suggest that there is a *coarse-grained mapping* between ToM and Type II processes, particularly when ToM is explicit, because ToM inferences and conclusions will involve conscious and controlled retrieval of data from higher cognitive mechanisms (e.g., meta-representation). Bohl and van den Bos, in the same vein, associate Type I processes with the interactionist framework, suggesting that both types of processes work in parallel and may or may not interact. A more similar approach, however, to the default-interventionist dual-process framework is offered by Leslie and Thalis (1992), Leslie and Polizzi (1998), Leslie, Friedman, and German (2004), and Leslie, German and Polizzi (2005). Leslie and colleagues advance that ToM involves the generation of a set of inferences/belief candidates from specific representational cognitive mechanisms (i.e., Type I cognitive processing), and that these beliefs are further processed by an executive selection processor (i.e., Type II cognitive processing). Leslie and colleagues further argue that the ability for humans to make inferences about other minds is introduced to the cognitive system through a theory of mind mechanism (ToMM), because the particular inferences that come to form ToM are not innate, even though the capacity to form these inferences is innate. Leslie and colleagues adeptly illustrate this point by providing an analogy about the conceptualisation of colour by very young children. Children are not born with a theory of colours (e.g., the extent to which crimson differs from burgundy), even though children possess the ability to comprehend all colours within their visual colour spectrum. Children instead learn from the experience of seeing colour and assigning different observed colours to appropriate referents in the real world.

ToM has traditionally been investigated through the false-belief task, and although this task has many variants, one of the most replicated versions is the Wimmer and Perner (1983) Maxi task. Wimmer and Perner presented children aged between three to nine years old with a character named Maxi who puts an

object (a piece of chocolate) in box A. Maxi's mother then moves the object from box A to box B in Maxi's absence. Following this, participants were asked in which box Maxi will look for the object upon his return. Across a series of experiments, Wimmer and Perner showed that children become adept at inferring the false-beliefs of others only from four to six years old. The same experimental paradigm was utilized by Baron-Cohen et al. (1985) to explore the hypothesis that children with autism lack ToM in comparison with typically developing children. To achieve this, Baron-Cohen et al. compared responses from autistic children with those of typically developing children and children with Down's syndrome about a doll (Sally) who placed an object into a basket A, which was moved to basket B by another doll (Anne) in Sally's absence. When the participants were asked where Sally will look for the object upon her return, only autistic children failed the task, and this was interpreted as a result of their inability for ToM (i.e., their inability to represent Sally's current belief as opposed to what they themselves know to be true). These false-belief tasks and their variants have been repeatedly utilised to assess ToM and associated constructs (e.g., false-belief understanding and language ability: Milligan, Astington, & Dack, 2007; false-belief and morality: Killen et al., 2011; false-belief and maltreatment: Cicchetti et al., 2003; false-belief and assertion: Jary, 2010; false-belief and desire: Ziv & Frye, 2003; false-belief and executive control: Mutter, Alcorn, & Welsh, 2006; false-belief and bilingualism: Nguyen & Astington, 2014).

Leslie, German, and Polizzi (2004), likewise utilized a modification of the false-belief task to support their hypothesis that ToMM generates a set of initial beliefs from which a second process selects an appropriate belief. For a correct belief to be obtained, a crucial aspect of this second process involves the inhibition of other beliefs included in the response set from the first process. In Leslie and colleagues' modification of the false-belief task, rather than the participant responding to where the person (person X) who placed the object in location A will look for the object (when the object has been moved to location B), the participant has to respond to where person X who (now) desires to avoid the object will look. Leslie and colleagues showed that children (even at the age at which the traditional false-belief task is passed) find this task much more

difficult. According to Leslie and colleagues, children find it harder because the prediction of person X's action also mandates an inhibition of other sets of responses.

Leslie and colleagues discuss their findings in relation to how individuals assuage their desire in response to their beliefs. This general proposition is very similar to Mercier and Sperber's (2011a, 2011b; Mercier, 2011a, 2011b, 2011c, 2011d)hypothesis, discussed earlier, that argumentation is the function of reasoning, which evolved to justify conclusions generated intuitively. The accounts of both Leslie and colleagues and Mercier and Sperber, although not explicitly stated (perhaps because they are not necessarily dual-theorists but seek to accommodate their theories within the dual-process approach), are situated within the default-interventionist approach. To be clear, ToM is not solely one's anticipation of the behavioural response of another individual; it is also the understanding of the knowledge and beliefs, goals and perceptions of another individual, as well as one's prediction of the individual's response based on one's knowledge (Call & Tomasello, 2008).

3.3 Cognitive Closure, Conformity, and Motivated Cognition

The need for cognitive closure (NFCC) is a motivated cognitive response to the desire for "any answer", particularly in confusing and ambiguous situations (Amit & Sagiv, 2013; Kruglanski, 1989, 1990; Kruglanski & Webster, 1996). NFCC in this regard enables a base for action, such as predictability, and the urgency of this need is "assumed to be proportionate to the perceived benefits" (Webster & Kruglanski, 1994). Conformity on the other hand occurs when anindividual alters his behaviour to avoid group disapproval (normative conformity) or when the individual genuinely lacks information (informational conformity). How does NFCC differ from conformity? Are they two different frameworks within two different branches of psychology that explain the same phenomena through different lenses?

Studies have shown a positive relationship between conformity and NFCC (e.g., Calogero, Bardi, & Sutton, 2009). However, conformity, through the classic

distinctions of normative conformity and informational conformity is reasoned out and typical of Type II cognitive processing, while NFCC is quick and automatic, typical of Type I cognitive processing. Two frameworks discussed in detail in previous sections (CEST and argumentative theory) offer a conceptual bridge through which we might hypothesize a link between NFCC and conformity through the different cognitive processes that enable them.

According to CEST, the experiential system (Type I cognitive processing) is evolutionarily older than the rational system (Epstein et al., 1996). This conceptualisation of evolutionary older Type I processes ties in with Mercier and Sperber's (2011) argumentative theory, which posits that reason (a Type II process) evolved to support conclusions generated by intuitive (Type I) cognitive processes. If this is the case, then one might hypothesize that, at least in ambiguous situations (which is a requirement for the activation of NFCC), when individuals conform, they would have already done so automatically and non-consciously, and only moments later tried to justify why they had altered their behaviour (i.e., for either normative or informational reasons).

NFCC is a unitary latent variable comprised of 5 subscales: preference for order, discomfort with ambiguity, preference for predictability, close-mindedness, and decisiveness. It mediates information processing through either an urgency-'seizing' tendency (a desire to attain closure as soon as possible) or a permanence-'freezing' tendency (a desire to preserve past knowledge or to safeguard future knowledge [Webster & Kruglanski, 1998]).

Much research has been carried out, particularly within socio-cognitive psychology, on implicit motivation, specifically on the implicit influence of goals (e.g., Aarts & Dijksterhuis, 2000; Bargh, 1990; Bargh & Ferguson, 2000; Glaser & Banaji, 1999; Moskowitz, 2002; Shah, Kruglanski, & Friedman, 2002). Studies on implicit motivation generally propose a hierarchical connectivity of mental representations between goals and behaviour, with the former at the top and the latter below (e.g., Carver & Scheier, 1981; Wegner & Vallacher, 1987). Based on this hierarchical connectivity of mental representations, it is assumed that the motivation for goals encoded consciously can automatically and non-

consciously affect behaviour, particularly when these implicit goals are primed through exposing individuals to specific associated primes (e.g., Custers & Aarts, 2005; Gollwitzer, 2011; Strahan, Spencer, & Zanna, 2002). For instance, Karremans, Stroebe, and Claus (2006) gave one set of participants a salty sweet known to induce thirst and another set of participants no sweet (Study Two), and then asked the participants to perform a visual detection task on a computer screen. During the task, participants were primed with either the beverage "Lipton Ice" or a control word. The results showed that when given a choice between Lipton Ice and an alternative drink afterwards, participants significantly choose Lipton Ice over the alternative, but only for participants induced with thirst and thus having the goal to quench their thirst.

Adopting the same paradigm as Karremans et al. (2006), but with a focus onmental concentratation rather than to thirst-quenching, Bermeitinger et al. (2009) demonstrated that participants who (a) were subliminally primed with the sign (logo) of a concentration-enhancing pill (dextrose pill), (b) were tired, and (c) had the motivation for concentration, consumed more of the pill in comparison to the control group who were not primed with the sign of the pill. Studies have further shown that unfulfilled goals aroused unconsciously can go on to negatively affect the mental states and subsequent behaviour of individuals. For example, Masicampo and Baumeister (2011) showed that fluid intelligence (Study One) and impulse control (Study Two) are inhibited in participants who have been non-consciously influenced (primed) to achieve a goal and further manipulated to not be able to achieve that goal.

The neurotransmitter dopamine has been found to play an important signalling role in goal dependent and motivational behaviour (Khamassi et al., 2008; Hitchcott, Quinn, & Taylor, 2007; O'Doherty et al., 2004 Schultz, 1997; Shohamy & Adcock, 2010; Suri, 2002). It has been found that rewarding events activate dopamine neurons, and that signals from these neurons are reinforced by repetition and prediction error signals (Schultz, 1997; Suri, 2002), suggesting that dopamine causes a bias towards favouring memories of motivational significance (for a review see Shohamy & Adcock, 2010). Through the use of event-related functional magnetic resonance imaging, Copland et al. (2009)

showed that frequency-based semantic focus is enhanced by L-DOPA, and suggested that L-DOPA decreases the activation of competing associations, thereby heightening the focus of the primed semantic concept administered through a lexical ambiguity task.

Relevant to the present thesis, in terms of the effect of religious vs. secular primes (signs), isastudy carried out by Butler, McNamara, and Durso (2010). Butler et al. investigated the difference in the religious semantic networks of participants with Parkinson's disease versusneurologically normal participants. Parkinson's disease is a neurodegenerative ailment that interrupts the mescocortical dopaminergic networks and is characterised by severe depletion of dopamine in the striatum (Dagher & Robbins, 2009; Dauer & Przedborski, 2003; Williams-Gray et al., 2007). In the study by Butler et al. (2010), participants viewed one of three primes (civil, religious, or neutral) and target phrases matched to the preceding prime in the particular conditions. Afterwards, participants were required to respond accurately and immediately (by hitting a 'yes' or 'no' button) if the presented task was likely to be performed by them. Using the response times of the participants, Butler et al. demonstrated that patients with Parkinson's disease showed significant deficiencies in the automatic and non-conscious activation of religious concepts in their semantic networks. Dopamine deficiency inhibits the activation of religious concepts in religious semantic networks, and goal-dependent events activate dopamine neurons, reinforced by repetition and prediction error signals (Schultz, 1997; Suri, 2002).

In line with the default-interventionist framework, the default set of inferences generated by Type I cognitive processes such as cognitive closure and agency detection need not necessarily be the final output that affects behaviour. Type II cognitive processes, depending on the individual and the context, can intervene by modifying or altering the content of the set of inferences generated by Type I cognitive processing. For instance, in pre-enlightenment environments, in reaction to the sound of thunder, one's need for cognitive closure (NFCC) might motivate the detection of agency responsible for the sound as some sort of powerful supernatural being. With cultural learning (e.g., religious learning) a

specific agent in a specific culture is identified and named as the agent responsible (e.g., Amadioha in Igbo, Indra in India, or Thor in Norse mythology). After this information is embedded in memory, when the autonomous cognitive processes of NFCC and agency detection are activated, the conclusion arrived from the set of inferences generated by Type I processes is no longer an ambiguous 'powerful supernatural being' but Amadioha, Indra, or Thor. In the above example, the extra qualifying information is provided by the intervening function of Type II processing. Cognition, however, is intricate; the urge to identify (i.e., NFCC) and the act of identification itself (i.e., agency detection) are insufficient, and cognitive processes also autonomously make inferences about the mind of the agent identified (i.e., ToM).

3.4 Immortality Bias

Human are biased toward thinking that at least some qualities of personhood continue after death, and it is theorised that this bias reveals intuitive (Type I) patterns of reasoning that support the acquisition of religion (e.g., Bering, 2002; Bering & Bjorklund, 2004, Bering, Hernandez Blasi, & Bjorklund, 2005). Studies that investigate immortality bias generally utilize children as participants to avoid the confounding effects of cultural/religious narratives of immortality, and to get a glimpse into how they intuitively conceptualize immortality.

Bering and colleagues (e.g., Bering & Bjorklund, 2004; Bering, Hernandez Blasi, & Bjorklund, 2005) as well as Emmons and Kelemen (2014) have championed much of the research on immortality bias in children. Bering's (2002) rationale for assessing future immortality in children is informed by the simulation framework (e.g., Harris, 1992) which generally posits that Child A can only simulate the mind of Child B if Child A imagines a "divergent stance" that Child B assumes towards a "discrepant reality" (Harris, 1991, p.292). Using the simulation hypothesis, Bering (2002, 2006) argues that since it is epistemologically impossible for a child to know what it is like to be dead, the knowledge base from which a child imagines a divergent stance and a discrepant reality is itself imagined. Further, from this imagined knowledge base, it is easier to conceptualise the absence of physical categories such as

biological, psychobiological and perceptual states that have been experienced subjectively than to be able to conceptualise the absence of mental states such as emotional, epistemic, and desire categories. Therefore, Bering argues that the conceptualisation of the far removed mental states of dead agents is inferred from an intuitive pattern of reasoning.

To demonstrate children's intuitive pattern of reasoning about dead agents in an American sample, Bering and Bjorklund (2004) showed children a puppet show in which a mouse is eaten by an alligator. The children were then asked questions about the biological and psychological functioning of the dead mouse. Children aged between four and six years old reported more biological future immortality of the dead mouse than children aged between six and eight years old (Experiment One). Experiment Two showed that discontinuity of psychological future immortality increased with age, and Experiment Three showed that overall, adults and older children tended to report discontinuity of both biological and psychological future immortality more than younger children. These findings were generally replicated with samples of Spanish children from a secular and a Catholic school. Children in the Catholic school, however, reported more future immortality than children in the secular school (Bering et al., 2005). Bering and colleagues interpret these findings as evidence that younger children reveal more intuitive patterns of reasoning than older children.

Despite the different interpretations of simulation theory (ST), it is generally agreed that one utilizes one's own mind to simulate what other minds might be like (Gallese & Goldman 1998; Goldman 1989, 2006). Bering (2002) also posit that since it is epistemologically futile to cognize what it is like to be dead, the mind of dead agents will be conceived of as similar to that of the living. According to this view, when conceiving of the minds of dead agents, physically unobservable states (i.e., epistemic, desire, and emotional) are presumed to persist while physically observable states (i.e., biological, psychobiological, and perceptual) are presumed to cease.

Bering and Shackelford (2004) and Johnson and Bering (2006), based on studies on the evolution of cooperation (e.g., Johnson & Kruger, 2004), propose

an “intentionality system” as a specific cognitive system dedicated to generating inferences concerning the epistemic contents as well as intentions of the minds of others. Johnson and Bering argue that the intentionality system evolved specifically for observing and regulating the movement of social information within groups, and attributing the events in one’s life and one’s broader community to the minds of other supernatural agents. This hypothesis, particularly the point about supernatural agents, feeds directly into the supernatural punishment hypothesis advanced by Johnson (2005, 2011), Johnson & Bering (2005, 2006) and Johnson and Kruger (2004).

Johnson and colleagues, like the anthropologist Hartland (1924), propose that belief in and fear of supernatural punishment can act as a deterrent against breaching tribal law (in Hartland’s case) and religious rules (in Johnson and colleagues’ case). Johnson and colleagues however further assert that the fear of supernatural punishment is a specifically evolved cognitive mechanism for the acquisition of religion, that offers the following four selective advantages: elimination of (second-order) free rider problems, elimination of the responsibility of group member vigilantes, elimination of human deceit, and elimination of delayed/abandoned/fraudulent/discriminant/nepotistic human tendencies in punishing defectors. Although Johnson and colleagues suggest that the fear of supernatural punishment is an adaptation that was specifically selected for, it contradicts the more general consensus within CSR, that religious cognition is the by-product of mental adaptations that evolved to fulfil non-religious functions (e.g., Barrett, 2000; Boyer, 1994, 1996, 2000; Guthrie, 1980, 1993; McCauley, 2000; Sperber, 1996).

The future immortality studies by Bering and colleagues also fail to disambiguate how reasoning about dead agents differs from reasoning about other agents. Boyer (2003) criticizes Bering’s (2002) proposition that the ability to represent dead agents was specifically selected for, and instead favours an account which suggests that the conceptualization of dead agents is part of a broader representation of agents *in absentia* (e.g., people never encountered or institutional bodies like “the government” [p. 237]). Hodge (2008) similarly proposes that the results of Bering and colleagues are best interpreted through

offline social reasoning (Currie, 1997; Gendler, 2006), that is, the capacity to consider and arrange future interactions with absent conspecifics.

Bek and Lock (2011) show that the expression of belief in the emotional category of future immortality is influenced by biological contextual influences. Bek and Lock therefore argue that if simulation is a default mechanism then the conceptualization of future immortality should not be subject to contextual effects. Bek and Lock particularly criticise Bering's examples that differentiate physical states from mental states, such as; it is easier to imagine not feeling hungry (i.e., physical state) than to imagine not having any thoughts (mental states). Bek and Lock point out that "not feeling hungry" is particular, while "not having any thoughts" is general; like for like, one could argue that it is just as easy to imagine not having any thoughts about food as one could imagine not being hungry. Lastly, Bek and Lock, through factor analysis, show that the perceptual category did not load onto the same factor as the other categories in the physical state (i.e., biological and psychobiological) but loaded onto the same factor as the other categories in the mental state (i.e., epistemic, emotion, desire). Nonetheless, in accord with other personhood continuity studies (e.g., Bering, 2002; Bering & Bjorklund, 2004; Emmons & Kelemen, 2014), Bek and Lock also found that individuals express more belief in the continuity of mental states than physical states of future immortality. The above suggests that physical states generally differ from mental states but more research needs to be undertaken to disambiguate the different categories within these states, and how these different categories are affected by contextual and situational influences. Study Four in the present thesis investigates the religious vs. secular situational influences on children's conceptualization of retrograde immortality.

3.5 Religiosity and Intuitive/Minimally Counterintuitive Prepositions

Boyer (1994, 1997, 2000) proposes that religious prepositions which on the whole are intuitive, but comprised partly of a facet which violates ontological properties of intuitive assumptions, are generally more remembered and better communicated than prepositions which are either entirely intuitive or entirely

counterintuitive/nonsensical. For instance, the preposition that an invisible humanlike agent with no bodily mass can pull an object contradicts intuitive assumptions about folk mechanics, but relies on intuitive assumptions about the general abilities of typical human agents, and is therefore minimally counterintuitive in comparison with, for instance, the highly counterintuitive preposition that a pebble can pull an object upwards, or the highly intuitive preposition that a human can pull an object upwards. Minimally counterintuitive prepositions are memorable and easily transmitted because they bridge assumptions about the natural world which are easy to remember with conceived elements of the supernatural which captivate (Atran & Norenyazan, 2004; Atran & Sperber, 1991). This bridge taps into an immense cognitive network of culturally-independent implicit beliefs (Boyer, 1994), and opens up the possibilities of a host of other implicit inferences (Barrett, 2004). For instance, if it (the invisible agent) can pull, then it can push.Atran and Norenyazan (2004) class intuitive knowledge into the following domains: folkpsychology (goal-directed behaviour), folkbiology (the biological configuration and relationship among species), and folkmechanic (movements of objects and their boundaries).

Aarnio and Lindeman (2007) define paranormal beliefs, including magical beliefs, supernatural beliefs, and superstitious beliefs, as “beliefs in physical, biological or psychological phenomena that feature fundamental or core ontological properties of another ontological category” (pp. 586-587). They show that paranormal belief is correlated with high intuitive thinking and low analytical thinking, using the Rational Experiential Inventory (REI; Pacini & Epstein, 1999). Further, high intuitive thinking was theorised to be more integral in paranormal thinking than low analytical thinking, suggesting that intuitive thinking and analytical thinking are not on opposite ends of a continuum but rather dual processes. Shenhav, Rand, and Green (2011) similarly showed through the cognitive reflection test (CRT; Frederick, 2005) that analytical thinking is inversely related to belief in God, because intuitive thinking enables religious belief. Pennycook et al. (2012) extended this explanation, in a manner reminiscent of early dual theory systems, to show that depending on the context, analytical thinking can also enable religious belief, particularly in

instances in which individuals have analytically thought about how they non-conventionally perceive God (as an abstract force, for instance). Pennycook et al., however, referencing insights offered by the cognitive science of religion (CSR), further state that analytical reasoning leads to rejection of religious beliefs not because religious beliefs are intuitive but because they are counterintuitive. Although also used by some CSR researchers, 'counterintuitive' in this sense is misleading if used without prefixing it with 'minimally' because within CSR, minimally counterintuitive religious beliefs are considered memorable and easily transmitted particularly because of their high intuitive content and low counterintuitive content.

3.6 Doctrinal Religiosity, Automaticity, and the Intendant of Signs

Whitehouse (1995, 2000, 2001a, 2001b, 2002a,2002b, 2004, 2005) classifies religion into two major modes: doctrinal and imagistic. According to Whitehouse, doctrinal religion is a centralized mode of religion, characterized by a high frequency of repetition, while imagistic religion is a decentralized mode of religion characterized by a low frequency level of repetition. The former spreads and maintains religious information through less emotionally-arousing but repetitive rituals, while the latter spreads and maintains religious information through highly emotionally-arousing but low/non-repetitive rituals. The former, through its repetitive mode and high volume of religious text utilizes semantic memory, while the latter, through its highly arousing mode utilizes episodic memory.

The Abrahamic religions (Judaism, Christianity, and Islam) are quintessential examples of the doctrinal mode of religion. Within this mode of religion, repetition is assumed to lead to what Whitehouse terms the "tedium effect", where over-familiarity with particular units of information leads to a deficiency in active conscious processing of those units, as a consequence of the high level of repetition. Within the automaticity view of cognition, two types of automatic processes can be distinguished, i.e., processes that are unlearnt (e.g., agency detection) and processes that are learnt and repeated so often that they become automatic (e.g., the need to push a door handle downwards before

opening the door). It is within this second mode of automaticity that Whitehouse's tedium effect belongs. Stanovich (2004) terms these Type II-cum-Type I processes as the set of autonomous subsystems (TASS), while Smith and DeCoster (1999, 2000) term them 'functionally parallel neural networks'.

The signs utilized in the present thesis, particularly the religious signs signifying a benign God and a punitive God respectively, gain from all the cognitive processes discussed above. For instance, the subject of the Christian religious signs point to an agent, knowledge of the agent provides a source of cognitive closure for existential questions, Christian doctrine informs our ToM about the agent, and most of the stories associated with the agent are minimally counterintuitive. Further, the points above are repeated to Christians (who constitute the majority of the population where the experiments in the present thesis were carried out) to a high degree of frequency, until these associations become automatic and no longer require conscious processing.

'The intendant', Cousins's (2012) third facet in his telic triad model of signs (which includes the signifier, the intendant, and the signified), captures an aspect of semiotics of particular interest to the role of automaticity in the present thesis. The intendant is not a conscious interpretation of the link between the signifier and the signified, but an autonomous interpretation based on pre-existing associations between the signifier and the signified already established in memory. Figure 2 illustrates the links among the signifier, the intendant, and the signified.

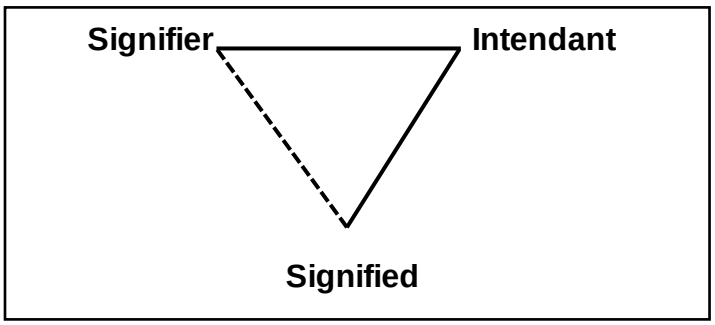

Figure 2.Cousins's (2012) telic triad model.

In Cousins's (2012) telic triad model, the link between the signifier and the signified is dependent on the particular intendant of the subjective individual; the signified changes if the intendant changes, hence the line linking the signifier to the signified is dotted in Cousin's model of his telic triad model. For an example of how the link between the signifier and the signified changes based on the intendant, see Figure 3.

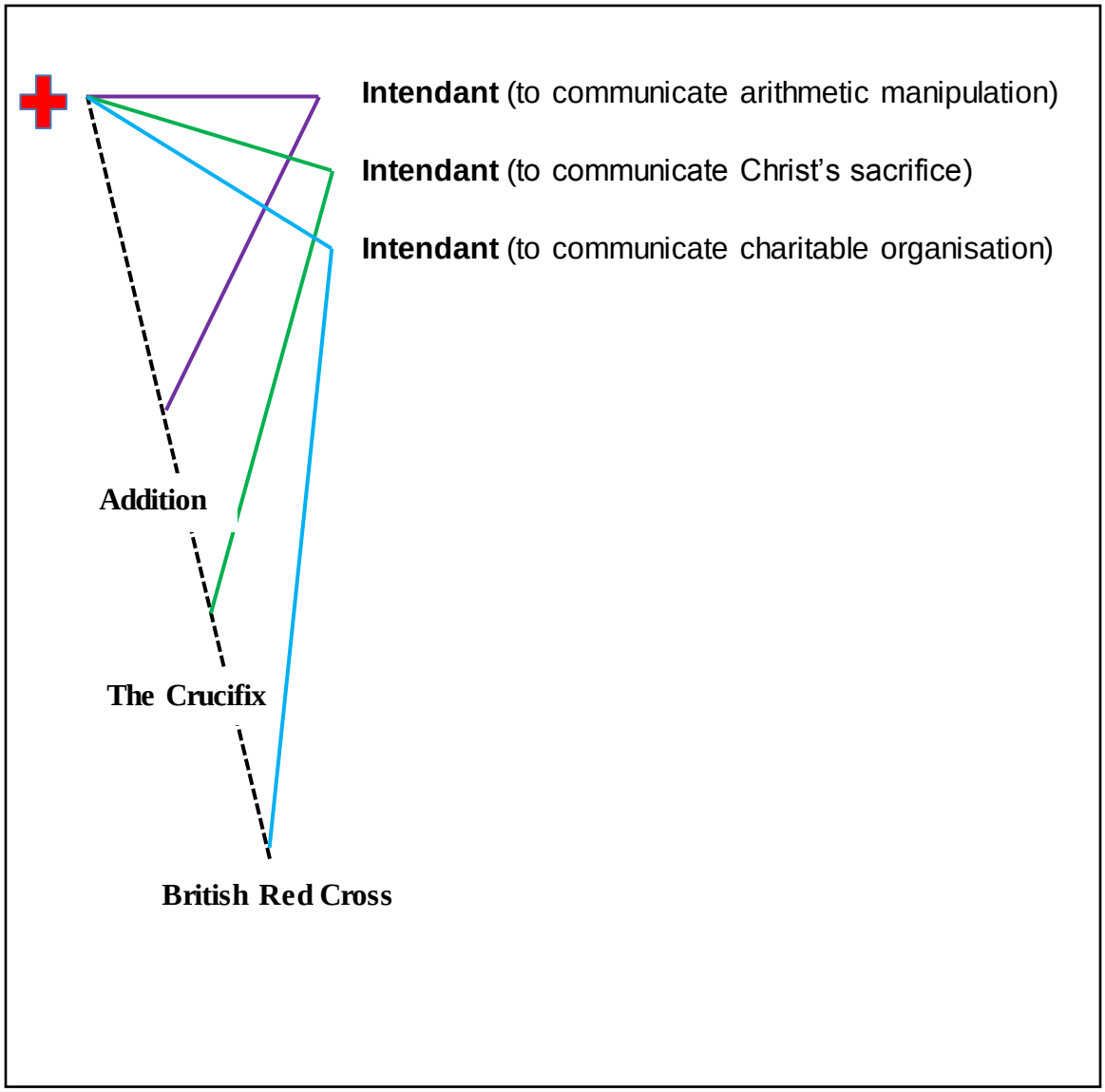

Figure 3.The changing nature of the signifier-signified link, based on theintendant.

Figure 3illustrates a non-exhaustive example of how the cross (or plus sign) could have different intendants, depending on the subjectivity of individuality and the context in which the sign is viewed. For instance, the first intendant could be by a mathematician / in an arithmetic book, the second intendant could be by a Christian / in a church, and the third intendant could be by a fundraiser / at a relief operation.

3.7 Further Considerations

3.7.1 Cultural Anthropology and the Incompleteness Thesis

The incompleteness thesis conceives of the mind as incomplete before its interaction with culture, postulates an interactive coevolution between culture and mind, and asserts that any explanatory rationale developed to account for the human mind without a consideration of this interaction will be incomplete (Geertz, 1973; Hoffmeyer, 1997, 2007, 2008; Kampis 1998; Kull, 2000; Maran & Kleisner, 2010). This preposition was proposed independently, as Cousins (2014) points out, by Morgan (1896), Osborn (1896), and Baldwin (1896). While older theorists such as Baldwin (1892) viewed the influence of culture as a tool for coping with evolutionary selection pressures, more contemporary theorists (e.g., Cousins, 2014; Kohler, 2014) view the cultural knowledge base as a niche (i.e., as a selection pressure *itself* when firmly embedded within the social ecology of a population). Also, where Baldwin saw an already-manipulated environment influencing succeeding generations, Cousins sees a dynamic environment influencing those who manipulate it further.

In support of the incompleteness thesis, Geertz (1973) rationalises how the tool-making/communicative signs of the cultural environment of Lower Pleistocene early hominins would have changed the adaptive environment they lived in and motivated cognitive and cortical development. Although this view suggests that humans were agents of their own evolution, crucially it does not imply that humans had a motivational goal toward a particular evolutionary ideal, and it denies that humans had any conscious control of the outcome (Kohler, 2014). Cousins (2014), arguing from a semiotic framework, uses language to further

his point about mind-culture coevolution through a number of criteria. Cousins' first criterion relates to the invariability of selection pressures, and posits that rather than seeing language as information processing with a set of rules (e.g., grammar) language should be seen as semiotic (i.e., meaning inferred through references by the interpreter), because language is understood through meaning-making. The second criterion relates to progress through modification (e.g., natural selection) and does not necessarily imply biological adaptation; Cousins argues that language also fits this criterion, where the early formation of a primitive linguistic niche would have been selected for and modified based on the feedback loop of mind-culture coevolution. The third criterion concerns the association between tools and language; Cousins argues that the former and latter co-evolved, with each gaining in degrees of complexity. Cousins 'third criterion is similar to Deacon's (1997) rationale behind his argument that the indexical and iconic representational processes in the brain might have influenced the brain's prefrontalization.

Mind-culture coevolutionary theory is often met with criticism, particularly within evolutionary psychology, where the mind is generally conceived of as composed of informationally encapsulated modules (Tooby & Cosmides, 1995). However, viewing the debate from the default-interventionist dual process perspective, one might argue that both mind evolution and mind-culture coevolution theorists seem fixated on different mental processes, and this fixation can be gleaned from the very examples they utilize. Mind evolution theorists seem to focus on Type I processes while mind-culture coevolution theorists seem to focus on Type II processes. Cousins' (2014) use of language is a case in point. Language, as Carruthers (2006) argues, could be a Type II process that integrates inferences from evolutionary older modules (i.e., Type I) within the mind. One way Cousins could further his hypothesis would be to critically engage with Carruthers' insistence on the creative meaning-making of literary devices and figurative language, which forms new synaptic associations that would have never been formed otherwise, and if rehearsed, become part of the cognitive architecture.

3.7.2 A Brief Economic Contextual Consideration

Socioeconomic status (SES) has been shown, across a number of surveys and studies, to be inversely related to religiosity, i.e., religiosity increases as SES drops, and vice versa (Barber, 2011; 2012; Heaton, 2013; Norris & Inglehart, 2004; WIN-Gallup, 2012). A Gallup Global Report (2010) spanning 114 countries showed that, excluding the US (because it doesn't fit the trend), the poorest countries in the world (mean per-capita income ≤$2,000) were the most religious, while the richest countries (mean per-capita income ≥$25,000) were the least religious. Barber (2012) further analysed the Gallup Global Report data to show that religiosity is negatively related to advancement in welfare systems, equality of income distribution through taxation, favourable health care, and economic development. Barber (2011) had made a similar observation with data spanning 137 countries.

The correlation between SES and religiosity, although strongly negative in general, is also affected by other national characteristics such as the country's history of contact with religion, the provision of education by religious establishments, nature of the particular religion/s, and cultural valuation of religious tolerance playing important roles (Heaton, 2013). Some researchers further doubt that there is a clear relationship between SES and religiosity, arguing that it is only prevalent in African and Asian countries, and countries with poor data quality (e.g., Cristobal, 2009). Nonetheless, Nigeria is one of the most religious countries in the world (WIN-Gallup, 2012) and has a low SES (Sala-i-Martin & Subramanian, 2013).

The uncertainty hypothesis presupposes an evolutionary cognitive adaptation, whereby the ability for religious acquisition evolved to deal with the uncertainty of uncontrollable forces in fitness-relevant events, such as those affecting survival. This view thus implies that heightened uncertainty increases religiosity (to address the uncertainty), and addressed uncertainty reduces religiosity. Variants of this framework include the uncertainty-identity theory (Hogg, 2007) and personal uncertainty theory (van den Bos et al., 2006). Somewhat similar to the uncertainty hypothesis, the existential security hypothesis posits that the

psychological anxiety invoked by life-threatening situations encourages religiosity, and the strength of the appeal of religiosity is reduced when such life-threatening situations are addressed (Norris & Inglehart, 2004). For instance, in modern welfare states with high SES across Western Europe, in which basic amenities are provisioned to address life-threatening problems such as poverty, infant mortality, maternal death, and HIV, the need for religion has been reduced. However this need remains high in African and Asian countries where these problems are not being solved (Barber 2011; 2012; Gallup, 2010; WIN-Gallup, 2012).

The uncertainty hypothesis and the existential security hypothesis are not mutually exclusive; Barber (2011; 2012) combined both to explain the relationship between SES and religiosity, such that when anxiety about existential uncertaintyrises, religiosity also increases. These views, however, tend to leave out other psychological variables such as the influence of informational conformity.

3.7.3 Religion, Childhood Indoctrination and Conformity

Knowing what kind of information to spend attentional resources on is critical for children to learn to encode information about the world effectively; they are directed in this regard by parents, teachers, peers and others (Morris et al., 2012). Children from about the age of four begin to comprehend that evidence (i.e., perceptual experience) predicates knowledge (Wellman, Cross, & Watson, 2001), and to appreciatethe importance of the attestation of others formaking inferences about the world (Koenig, Clément, & Harris, 2004). About 93% of the Nigerian population are religious (Chiluwa, 2012; Mandryk & Johnstone, 2001), which implies that most of the people whochildren look up to when forming inferences about the world will be religious adults. Although systematic research has been done on how belief systems gained in childhood are influential in adulthood, not much of this research has been religiosity-related, particularly within sub-Saharan Africa. To shed more light on the argument presented here, we shall consider the non-conscious activation of stereotype knowledge in adults, gained during childhood.

Duncan (1976) demonstrated in a stereotype activation study that ambiguous acts by individuals can be evaluated by other individuals based on their predetermined attitudes. Duncan showed that after an ambiguous act (light shove) by one confederate on another was viewed by participants, it was rated as violent by 75% of participants when performed by an African American, and by 17% of participants when carried out by a Caucasian. This study was criticised for using a biased sample population (Caucasian participants), which was thought to undermine the results obtained. However, a similar study (Sagar & Schofield, 1980) was carried out using both African American and Caucasian participants, and it replicated the results of Duncan, showing that ambiguous actions performed by an African American were more negatively evaluated by both African and Caucasian Americans. Both Duncan and Sagar and Schofield suggested that the cognitive accessibility of the stereotypic association between the person and violence was stronger when perceiving an African American perpetrator versusa Caucasian perpetrator.

Building on Duncan's (1976) and Sagar and Schofield's (1980) research, Devine (1989) looked at a more complex interaction between (1) knowledge of stereotypes and personal beliefs acquired early in life and (2) recently modified beliefs. Based on studies which showed that stereotypes are established in childhood (e.g., Allport, 1954), Devine theorized that concepts about particular stereotypes can sometimes be in conflict with more recent personal beliefs, and if elicited non-consciously, the childhood belief might gain precedence. For instance, through recent association with a stereotypic character, a person might re-evaluate her preconception about that particular stereotype. However, stereotypical knowledge gained during childhood can still be elicited non-consciously and go on to affect behaviour. Devine's study assumed that stereotypical beliefs would be more accessible upon perception of stimuli associated more with that particular stereotype than with personal beliefs, because of the amount of previously activated associations (i.e., from childhood, compared with a recently acquired belief). The results of Devine's study demonstrated stereotype-consistent negative evaluation of African Americans when the process was non-conscious and automatic (i.e., implicitly

assessed); however when the process was conscious and controlled (explicitly assessed), stereotype-consistent evaluation was inhibited.

Within contemporary popular discourse, Dawkins (2006) champions the view that believers in religion arecasualties of childhood religious indoctrination (Coetsier, 2009). Dawkins (2006) and Humphrey (1998) both argue that ideas fed to children at a gullible and trusting age can go on to influence them for the rest of their lives. Dawkins particularly emphasizes the role of fear (of hell) in religious indoctrination. Through letters, interviews and correspondence, Dawkins shows that religious lessons given to children about eternal pain and suffering in Hell are not seen as merely metaphorical but are deeply embedded into their worldview. Ray (2009) has likened this religious indoctrination to a virus, more potent when inflicted in childhood. Dawkins (2006, p. 28) further asserts that this "virus" can only be gotten rid of if it is "not too insidious" or if the individual possesses a strong "native intelligence".

The classic distinction between normative and informational conformity (Deutsch & Gerald, 1955) offers a valuable tool to explore how children might conform to the beliefs of religious authoritative figures. It is certain that, expectin extraordinary cases, children are dependent at home (e.g., on parents), school (e.g., on teachers), and social gatherings (e.g., on guardians). From a normative conformity point of view, it is in children's best interest to alter their behaviour to match that of the authority figure whom they are under. This needn't necessarily be the case in cultures that promote freedom of thought in children, however, in the society where the empirical studies of the present thesis were carried out, children are expected to obeyand not question authority. Further, theirauthority figures are predominately religious (Luyaluka, 2016). From an informational conformity point of view, children are relatively susceptible in this regard: because social knowledge is accumulated as children grow older, if their society provides only religious knowledge, they will internalise this knowledge so that it shapes their developing worldview.

3.8 Prelude to the Series of Experiments Carried Out

Nigeria is a highly religious country (WIN-Gallup, 2012) and the two prevalent religions are Christianity and Islam (Chiluwa, 2012; Gallup, 2010; Mandryk & Johnstone, 2001; WIN-Gallup, 2012). These two Abrahamic religions are doctrinal (Atkinson & Whitehouse, 2011) and their adherents believe in the dichotomy of God/Devil, good/bad, and Heaven/Hell (O'Sullivan, 2013). Doctrinal religions are characterised by a high frequency of repetition which leads to the tedium effect (Whitehouse, 2005). The tedium effect occurs as a result of overfamiliarity with associated religious concepts, which leads to reduced conscious Type II processing, and increased non-conscious Type I processing, of these concepts. Within dual processes theories of cognition this transfer of processing from Type II to Type I is termed TASS (Stanovich, 2004) and occurs through the process of over-familiarity. The first study carried out in the present thesis was a preliminary study to ascertain the rate of repetition of God references in two non-religious Nigerian national newspapers.

A number of studies within the dual process framework synonymise religiosity with Type I cognitive processing and scepticism with Type II cognitive processing (e.g., Pennycook et al., 2012, 2013; Shenhav, Rand, & Greene, 2012). This proposed synonymic relationship between religion and Type I processing leads to the conclusion that religiosity is irrational. Studies Two (laboratory setting) and Three (real-life setting) in the present thesis challenged this assumption through utilizing the default-interventionist dual process framework. Implicit within the default-interventionist approach is the proposal that Type I cognitive processes provide the initial set of inferences which Type II cognitive processes act on (or override, depending on individual differences, e.g., level of pre-Abrahamic religious knowledge). Therefore, if an individual's Type I processing provides a set of religious inferences, that individual can go on to use her Type II processing to rationalize (e.g., through epistemological or functional rationality) and thus arrive at a rationalized conclusion. This line of argument also gains from Mercier and Sperber's (2011a, 2011) argumentative theory, which proposes that reason (Type II processing) evolved for supporting conclusions generated by Type I processes. In Studies Two and Three it was

hypothesised that when participants are exposed to secular symbols, no symbols, benign religious symbols, and punitive religious symbols, there will be a trend in religiosity-related inferential irrationality (RRII) scores. It was predicted that participants exposed to secular symbolism will have the lowest RRII scores followed by participants not exposed to any symbolism (control), followed by participants exposed to benign religious symbolism, and lastly, participants exposed to punitive religious symbolism will have the highest RRII scores.

Studies Four and Five engaged with specific cognitive mechanisms theorised to support the acquisition of religion within CSR. Study Four assessed immortality bias in Nigerian children. It is theorised that immortality bias reveals intuitive patterns of reasoning about personhood that leads to religiosity. These studies are generally carried out with children, because children's responses are more free of cultural/religious learning than those of adults. These studies generally show that (a) as children get older, they report less belief in continuity of personhood (i.e., reduced belief in life before birth and after death), and (b) greater continuity of mental states (e.g., emotional and epistemic states) over physical states (e.g., biological and perceptual states).Younger children's increased belief in continuing personhood is seen as reflective of their intuitive reasoning, while older children's decreased belief in continuing personhood is seen as reflective of their use of non-intuitive reasoning (e.g., deductive reasoning) acquired through cognitive maturity. Emmons and Kelemen's (2014) study was of particular interest to Study Four in the present thesis because of their utilization of retrograde immortality. Retrograde immortality is absent from most contemporary religions, particularly the Abrahamic religions, and responses to questions about personhood before birth are much less likely to be influenced by cultural/religious learning than questions about personhood after death. Study Four tested the hypothesis that children exposed to religious symbolism will report greater conceptualization of retrograde immortality in comparison with children exposed to secular symbolism, regardless of age.

The fifth and final study assessed the effect of religious and secular signs on agency detection and NFCC. Given the multi-faceted nature of religion, all

studies in the present thesis assessed specific aspects of religiosity. While Study Two and Three assessed religiosity-related inferential irrationality (RRII), Study Four assessed retrograde immortality, and Study Five assessed religious fundamentalism. Agency detection is theorised to play a significant role in the acquisition of religion (Barrett, 2004; Guthrie, 1993), and NFCC is positively correlated with religious fundamentalism (Brandt & Reyna, 2010). NFCC demands quick answers, while agency detection provides quick answers which religion qualifies (e.g., natural disasters might be attributed to Yahweh or Lucifer). Study Five investigated how agency detection explains the relationship between NFCC and religious fundamentalism. In this study, agency detection was separated into the detection of supernatural agency and the detection of natural agency; the former was hypothesized to positively mediate, and the latter to negatively mediate the relationship between NFCC and religious fundamentalism. The hypothesis was predicted to occur when participants are exposed to secular symbolism intended to prime uncertainty and not when participants are exposed to religious (benign and punitive) symbolism intended to prime religious certainty. Each study is presented below as a separate empirical chapter

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CHAPTER 4

Preliminary Study (Study One)

4. Religious References in Nigerian Newspapers and Informational Conformity

4.1 Introduction

All news outlets, including tabloid and broadsheet newspapers, execute a basic informative function. According to Fiske (1992), if something 'informs', then it concurrently disseminates knowledge and forms a subjective identity more compelling than reality; it forms a 'believing subject', and provides a subjective lens through which the world is comprehended. From the first Nigerian newspaper (*Iwe Iroyin*) created in 1859 by the British missionary Henry Townsend, print media has played an extensive role in disseminating information in Nigeria. The present study investigates the presence of God references in two non-religious Nigerian national newspapers (*The Guardian* - broadsheet and *Daily Sun*-tabloid) and discusses their implication for informational conformity. The study also serves to validate the centrality of religion in Nigerian society.

Van Cappellen, Corneille, Stéphanie & Saroglou (2011) showed that exposure to religious references increases informational conformity, but only in participants who score high in dispositional submissiveness. This relationship was demonstrated by exposing participants to 20 religious words in one treatment and 20 neutral words in another treatment, and then having participants in both treatments engage in a numeric estimation task. While engaged in this task, participants were provided with three false figures, putatively given by three previous participants. Afterwards, all participants were administered self-reported measures for religiosity and submissiveness. The results showed that participants who were exposed to the religious references, and who scored high in submissiveness, conformed significantly more to the estimates given to them, regardless of their religiosity. However, a previous

study(Saroglou, Corneille, & Van Cappelen, 2009) demonstrated that mere exposure to religious concepts activates submissiveness accessibility (Experiment 1) and even leads to morally questionable submissive behaviour (Experiment 2). This finding suggests a rather circular relationship between religiosity and submissiveness, whereby religious concepts positively influence submissiveness, and submissiveness positively influences religiosity.

Individuals do not conform to information just because they encounter it, certain conditions are required for this conformity to occur, and both religious doctrine and national newspapers fit adequately in their roles as 'content' and 'medium'. As content, religious doctrine addresses an ambiguity that is difficult to ignore: it provides answers to existential questions, such as the existence of God, the purpose of life, and whether there is life after death (Batson & Stocks, 2004), and it alleviates existential insecurity and uncertainty (Hogg, 2007; Norris & Inglehart, 2004; van den Bos et al., 2006). As mediums of information transmission, national newspapers are not as valid and reliable as peer-reviewed journals or textbooks, but are still considered important popular sources of information (Williamson, Qayyum, Hider,& Liu, 2012). Newspapers are readily accessible and affordable to the general public, and they report promptly on real life events that have had a verifiable impact on society (reports on natural disasters or sports results, for instance), which acts to bolster their credibility among the general public. It was hypothesized that due to the highly religious nature of Nigerian society, there wouldbe a high ratio of God references in both Nigerian Newspapers. Further, there would be a higher rate of God references in the sensationalist tabloid newspaper than the broadsheet newspaper. God references were categorized into the following: fear of God, plea to God, submissiveness to God, prayer to God, gratitude to God, use of religious threat, and other.

4.2 Method

Materials

Two non-religious Nigerian national newspapers were chosen based on their national distribution, readership, and brand name recognition within the English-speaking world. According to the International Research and Exchange Board's (IREX) Media Sustainability Index (MSI, 2012), *The Punch*, *Daily Sun, This Day,* and *The Guardian* have the widest circulation within the country. *The Punch* and *Daily Sun* both fall into the tabloid category, while *This Day* and *The Guardian* fall into the broadsheet category. These categories were determined by their journalistic ethics and socio-political and economic content, but not necessarily by page size. *Daily Sun* was used for the tabloid category because of its comparative brand name recognition, for instance; in Ireland there is the *Irish Sun*, in Scotland the *Scottish Sun*, in England *The Sun*, in Australia the *Herald Sun*, in the US *the Chicago Sun-Times*, etc. In the broadsheet category, *The Guardian* was used because of its comparative brand name recognition; it is present in the UK and US, and has variants in Australia (e.g., *Swan Hill Guardian, Geraldton Guardian, Northern Guardian, Healesville and Yarra Glen Guardian*).

Only weekday *Daily Sun* and *The Guardian* newspapers were analysed, from Monday to Friday, during the month of May 2012, from the 1st to the 31st days of the month, excluding the 5th, 6th, 12th, 13th 19th, 20th 26th and 27th, which were Saturdays and Sundays. Weekends were excluded because of religious activity nationwide and possible atypically high religious content in both newspapers. All analyses were carried out using IBM SPSS Statistics 20 on a Windows 7 computer.

Design and Procedure

A two-proportion z-test was used to test the difference in rate of god references per word between the tabloid and broadsheet newspaper.Every weekday morning during the month of May 2012, the national Newspapers *Daily Sun*(tabloid) and *The Guardian* (broadsheet) were bought from the same vendor in Lagos, Nigeria. Every page was read for references to God. God is referred to by various names, such as Lord, Allah, and Jesus; all such references were included.

Coding.

As the frequency of references was being taken into account, a number of subthemes emerged, and were coded as: 1= *Fear of God*, 2 = *Plea to God*, 3 = *Submissiveness to God*, 4 = *Praying to God*, 5= *Gratitude to God*, 6 = *Use of religious threat,*and 7 = *Other* (uncategorised). The code 'other' was used for clearly religious references that did not fit in any of the other six categories and could not be categorised into separate categories because they were either not clearly defined or did not appear enough times to warrant a category of their own. See Figure 4 for an example taken from the tabloid newspaper.

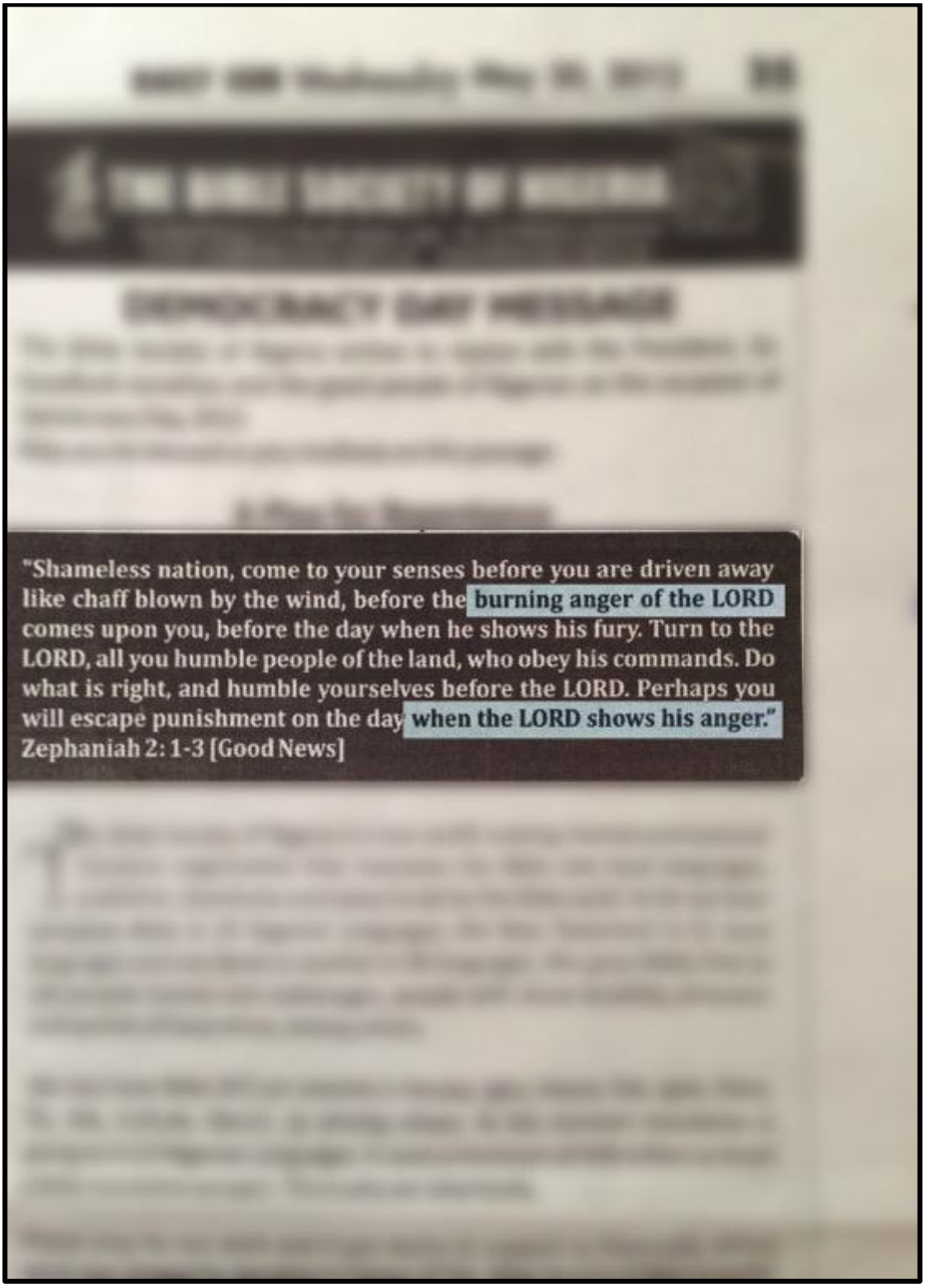


Figure 4.Example of 'Use of religious threat' subtheme from the tabloid newspaper.

4.3 Results

There were references to God every day in both the broadsheet and tabloid newspapers in the month of May 2012; out of every 1,000 words, references to God appeared 1.79 times in the tabloid and 0.66 times in the broadsheet. A two proportions *z*-test was carried out to test the difference in God references per number of words between the broadsheet and tabloid, with the significance level set at 0.01. The results show that the rate of God references per number of words in the tabloid (1,366 out of 765,440 words) was significantly higher than the rate of God references per number of words in the broadsheet (466 out of 680,363 words), $z = 18.53$, $p < 0.01$. See Figure 5 for further illustration of the difference in amount of God references per 1000 words between the tabloid and broadsheet.

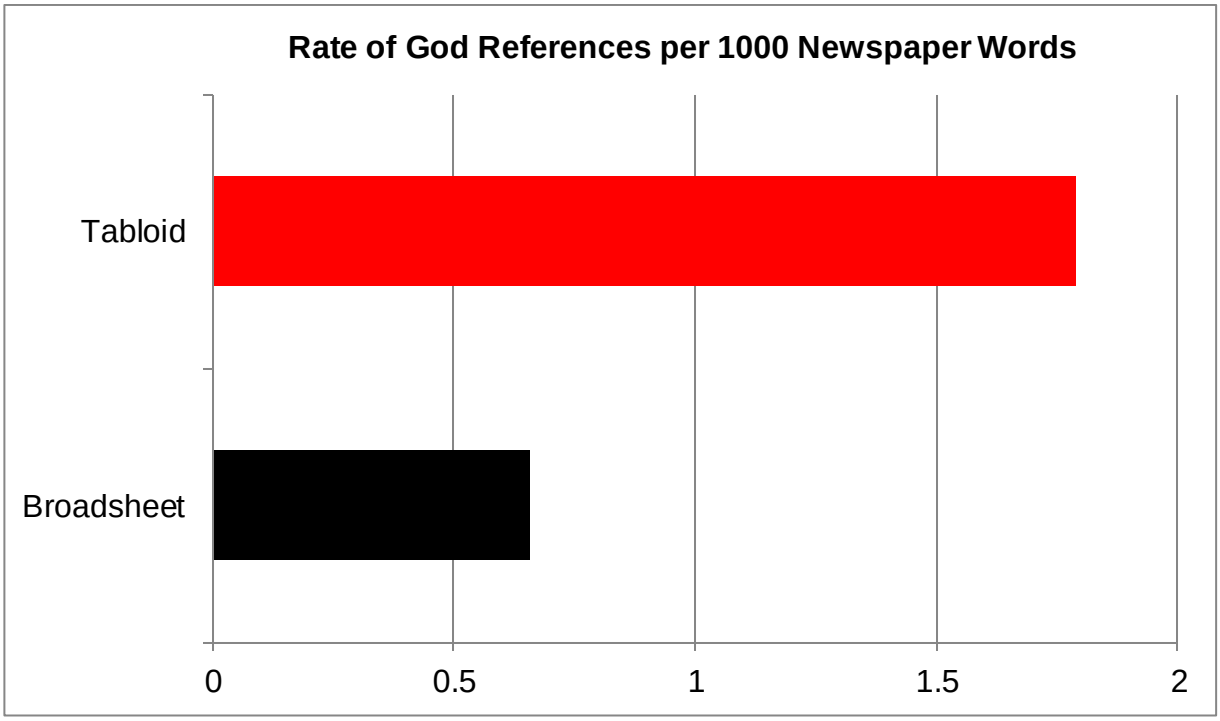


Figure 5. Difference in rateof God references per 1000 words between tabloid and broadsheet newspapers.

Six categorized sub-themes of God references were identified; of these, *submissiveness* appeared more times per day than any other categorized sub-theme in both the tabloid and broadsheet. *Submissiveness* appeared *M* = 16.70 (*SD* = 9.53) times per day in the tabloid, and *M* = 5.52 (*SD* = 3.36) times per day in the broadsheet. The subtheme *Use of religious threat* appeared the least (*M* = 0.17, *SD* =0.49) times per day in the broadsheet, while the subtheme *plea to God* appeared the least (*M* = 1.48, *SD* = 2.68) times per day in the tabloid. See Table 2 for a list of means and standard deviations of the sub-themes identified.

Table 2

Mean and Standard Deviations per day of Subthemes Identified in theTabloid and Broadsheet Newspapers.

	Newspaper type			
	Tabloid		Broadsheet	
Theme	Mean	SD	Mean	SD
Submissiveness to God	16.70	9.53	5.52	3.36
Gratitude to God	7.91	5.53	3.13	2.42
Prayer to God	5.30	3.28	1.78	1.38
Plea to God	1.48	2.68	0.70	1.26
Fear of God	1.61	2.15	0.52	0.79
Use of religious threat	1.52	2.19	0.17	0.49
Other (uncategorised)	24.87	13.07	7.57	5.81

4.4 Discussion

The present study demonstrated that during the weekdays of a randomly selected month (May 2012), there were references to God every day in two categorically different non-religious Nigerian national newspapers (tabloid and broadsheet). The tabloid had significantly more references to God per number of words than the broadsheet. Further, a number of sub-themes in the type of

reference to God were identified; the sub-theme *submissiveness* appeared more times per day than any other sub-theme in both the tabloid and broadsheet. The results are discussed in terms of the high rate of God references (particularly the theme submissiveness) in non-religious Nigerian newspapers and its implication of informational conformity. The difference in rate of God references between the tabloid and broadsheet newspapers is also discussed.

The rate of God references in the tabloid was almost three times higher than the broadsheet. It is noteworthy, however, that a substantial amount of articles in the tabloid had large amounts of quotes from interviewees and public speeches; these quotes carried most of the references to God, alongside the decidedly religious articles. Therefore, it was not always the tabloid journalist who referenced God directly, but indirectly through what he or she had heard or been told. Accordingly, it was not the same set of tabloid journalists, day after day, indoctrinating readers with religious dogma, but rather person after person, day after day, quoted by the same set of journalists.

The contents of particular religions (e.g., Christianity or Islam) are learned socially; therefore it is crucial to consider the social factors that sustain them. It is theorised that newspapers and the stories they contain influence the attitude of their readers (Boykoff, 2008); they create believing subjects, who see reality through subjective lenses (Fiske, 1992). The average individual is, arguably, not as gullible as this might suggest; from what is known of informational conformity, certain conditions need to be met, to create an ideal 'believing subject'. For instance, reporting 'blood is blue' would not be very successful because readers are familiar with both blood and the colour blue.

From as early as Sherif's (1935) study, it was clear that individuals are influenced by informational conformity when the context is ambiguous and answers are provided by the majority. It is heightened when there is a genuine need for fact, and once accepted it is internalised, acted out in public as well as privately (Lonnqvist et al., 2009). Religion is highly ambiguous; there are thousands of gods and goddesses across the world divided by ethnicity and

epoch in civilisation. In the modern religions in Nigeria (Christianity and Islam) there are various contradictions and cryptic metaphors lost in translation in their holy books (the Bible and Quran respectively). As discussed earlier, most of the God references came from quotes of ordinary people interviewed or reported on by journalists. One of the hallmarks of conformity is the persuasion of a majority opinion (Sherif, 1935) and one of the hallmarks of informational conformity over other forms of conformity is the persuasion of authority (Lonnqvist et al., 2009). The Nigerian tabloid investigated expressed the religious opinion of the majority by publishing their quotes, thus somewhat endorsing the content of these quotes.

Van Cappellen et al. (2011) showed that exposure to religious references increased informational conformity in dispositional submissive participants even when the context was non-religious. It has also been shown that mere exposure to religious references activates submissiveness accessibility and leads to morally questionable submissive behaviour (Saroglou, Corneille, & Van Cappelen, 2009). It was therefore suggested earlier that there might be a rather circular relationship between religiosity and submissiveness, whereby religious concepts positively influence submissiveness, and submissiveness positively influences religiosity. It could therefore be argued that while the journalists were writing, when the interviewees were being interviewed, when the speeches were being delivered or written, and when each participant non-consciously considered the role of religion in the event reported, *submissiveness* was implicitly activated in their minds. This vantage point may clarify why, among the sub-themes identified within the God references, *submissiveness* appeared more times than any other categorized sub-theme in both the tabloid and broadsheet. *Submissiveness* like many constructs can be multifaceted, based on the context in which it is used. In the process of coding the sub-themes for the theme *reference to God*, *submissive* was used in its function as a verb, i.e., the yielding of authority, and deferment of decision, opinion, and judgement to, an agent that is perceived as dominant to one's self. Examples of references that were coded as *submissiveness* in the tabloid include: "…surrender to the Lord", "…be contended with what Allah has provided for you", and "…virgin Mary submitted herself to God's will". Given the high levels of religious

submissiveness discovered in the present study, more research is called for to explicitly investigate this construct of 'submissiveness' in Nigerian society.

The present study offered a window into the pervasiveness of religion in Nigerian society by rating the number of God references in two non-religious Nigerian newspapers. The informational conformity impact of the high presence of religious references was explored in the discussion section. However, conformity was not assessed directly, future studies interested in exploring the themes of the present study should utilize conformity measures, as well as submissiveness measures.

CHAPTER 5

Study Two

5. A Default-Interventionist Approach to the Rationality vs. Religion Debate (Laboratory Setting)

5.1 Introduction

Almost all the studies considered in the conceptual chapters above regarding the link between religiosity and dual process theories with relation to rationality were carried out in what Henrich et al. (2010)have termed WEIRD societies. The conclusions drawn from these studies are useful in assessing the rationality vs. religion debate in populations with a strong culture of secular thought alongside a strong culture of religious belief. However, the conclusions drawn from these studiesoffer inadequate explanations for religious belief in populations without a strong culture of secular thought alongside a strong culture of religious belief, particularly for highly rational individuals. For instance, Pennycook et al. (2012, 2013) studies utilized US and Canadian participants respectively, and offer little insight on how to account for the conflicting results in studies such as Buzdar et al. (2015) carried out in Pakistan.

The present study was carried out in Nigeria, in line with the Henrich et al. (2010) emphasis on the need for psychology research to collect empirical data outside WEIRD societies, to broaden our understanding of mental phenomena across cultural variations. While WEIRD nations have witnessed an increase in secular thought in recent decades, placing more value on empirical analysis and scepticism (Bruce, 2011), developing countries (particularly sub-Saharan African countries) have witnessed a rise in religiosity (Anderson, 2013). For instance, the Win-Gallup (2012) global index on religiosity and atheism showed that out of 57 countries surveyed, Nigeria was the second-most religious; its neighbouring country Ghana was rated the most religious.

Religions are numerous, and particular religions are multifaceted. Common

contemporary examples include Theravada and Mahayana in Buddhism, Sunni and Shia in Islam, and Catholicism and Evangelism in Christianity. However, within the different branches of particular religions there are often symbols that bind across dividing lines, such as the statue of Buddha in Buddhism, the Crescent moon in Islam, and the Crucifix in Christianity. The present study utilized iconography associated with the Christian religion only, therefore the studies presented below are not intended as an assessment of religion in general, but of Christianity within the specific cultural context of Nigeria.

Rationality is also multifaceted and its generalization in the rationality vs. religion debate evades concrete conclusions, where at best it is agreed that some aspects of religion are rational and some are not, depending on how rationality is construed (Frances, 2015). Frances advances that in highly religious societies such as Nigeria—where most people maintain a normative religious worldview, whichhas been the status quo for many years, and where the religious society is functional (e.g., through prescribed moral codes)—religious belief may be viewed as epistemologically rational. From a dual-process perspective, Stanovich (1999) argues that deontic tasks (e.g., religious belief) that require normative responding through Type I cognitive processes are much less correlated with cognitive ability than abstract cognitive tasks (e.g., mathematical computations) that require analytical thought through Type II cognitive processes. From a philosophical perspective, Foley (1990) argues that it is futile to satisfy all conditions of rationality, and from a theological perspective Linde (2013) argues that religiosity is rational if religious belief is construed in a non-positivist way. Therefore, it is useful for studies interested in the rationality vs. religion debate to specify the facet of rationality that is of specific interest.

Kalberg (1980) summarises Weber's categories of rationality as: practical, substantive, formal, and theoretical. Scherer (1985; 2011) however offers a more contemporary three category distinction of rationality: functional, consensual, and inferential. Functional rationalityserves a Machiavellian end; it is reasoning fostered by one's anticipation of an intended outcome, and can be thought of as a self-interested calculated response. It is therefore problematic,

for example, to term a devout Christian's belief/action toward going to Heaven after death as irrational, if rationality is construed as functional. Consensual rationality generally refers to the appeal to common sense to favour the majority view. It is also questionable, therefore, to term the belief/action of a religious individual from a highly religious country as irrational, if rationality is construed as consensual. Inferential rationality is analytical in its approach and lays emphasis on logical conclusive arguments. Inferential rationality meets the three criteria of the modernist conceptualization of rationality, i.e. it must (1) be universally valid, (2) have clear associations among different components of relevant arguments, and (3) be determined by specific logical rules (Van Huyssteen, 1999). Rationality in the present study is construed as inferential, and a specific religiosity-related inferential irrationality (RRII) scale was developed.

Type I cognitive processes have been shown to be susceptible to priming across a number of studies. For instance, Tracy, Hart, and Martens (2011) showed that priming immortality led to more acceptance of intelligent design theory and rejection of evolutionary theory, even when attitudes toward evolutionary theory, level of education, religion, and religiosity were controlled for. Aveyard (2014) utilized contextual priming (Experiment Two) to influence Middle Eastern participants to cheat less on an unsupervised maths test, in comparison with participants who were not contextually primed. The present study utilized religious vs. secular primes to influence participants' Type I cognitive processing.

Religiosity can be primed as either a punitive or benign construct. Theory of mind (ToM), according to Premack and Woodruff (1978) is the mental state an individual imputes to himself about himself, conspecifics, and other species. ToM has been theorised to be responsible for the perception and anticipation of the actions of supernatural agents such as God (Bering, 2002). A more contemporary account of ToM is that it involves two minds, that of the perceiver and that of the perceived (Waytz, Gray, Epley, & Wegner, 2010). Therefore, the kind of mental state the perceiver (mind one) attributes to a supernatural agent (mind two) might differ according to the religious prime mind one is exposed to

about mind two (e.g., a reminder of God's love or a reminder of God's wrath). Johnson and Kruger (2004) propose that the 'fear of supernatural punishment' is a cognitive mechanism that evolved specifically for the acquisition and support of religious behaviour. Shariff and Rhemtulla (2012) show that crime rates are negatively predicted by belief in Hell and positively predicted by belief in Heaven, and Shariff and Aknin (2014) show that happiness and life satisfaction are associated with belief in Heaven and less so with belief in Hell.

In the present study symbolism associated with two levels of religious belief (i.e., benign Christian and punitive Christian) and secular symbolism were used to prime participants before they responded to a religiosity-related inferential irrationality (RRIl) scale. Although all religious symbols used were Christian, Nigeria is comprised of Muslims, Christians, and a minority of practitioners of indigenous religions. Therefore, participant religion was recorded and controlled for. High level of education has been linked with low religiosity across a number of studies (e.g., Halman & Draulans, 2006; Ruiter & Tubergen, 2009; Tracy et al., 2011). Therefore, the level of education of participants was also recorded and controlled for.

It was hypothesized that secular primes would cause the default Type I cognitive processes of participants to generate more secular-consistent inferences and conclusions, which would influence their use of Type II cognitive processes to respond to (and hence score lower on) the RRIl scale, in comparison with other participants. The following predictions were made 1) there would be a trend in non-analytic religiosity scores; in ascending order, participants primed with secular symbolism are expected to score the lowest, followed by participants in the control condition, followed by participants primed with benign religious symbolism, and lastly, participants primed with punitive religious symbolism will score the highest. 2) In comparison to participants primed with secular symbolism i) participants primed with benign religious symbolism will have higher RRIl scores, ii) participants primed with punitive religious symbolism will have higher RRIl scores, and iii) participants not primed with any symbols will have higher RRIl scores.

5.2 Method

Participants

There were 123 participants (male = 80, female = 43) aged between 18 - 36 years (M = 23.6, SD = 4.3). The majority were Christians (104), followed by Muslims (18) and one participant who classified himself as non-religious. Most participants (n = 82) were students of the University of Lagos, Nigeria (postgraduates, n = 3, undergraduates, n = 79), followed by university graduates (n =22) and non-students (n =19).

Ethical Considerations

The study was reviewed and approved by the Brunel University Research Ethics Committee. All participants were given a written informed consent sheet before participating in the study. Upon completion of the study all participants were fully debriefed and given an information sheet that summarised the purpose of the study and contained references to similar studies.

Materials

A 35sqm closed room in an educational centre in Lagos, Nigeria was used as a laboratory. Four black and white A3 laminated posters containing visual illusions were used for the distraction task. The illusions included: The camouflaged Dalmatian (James, 1970), Hermann grid (Spillmann, 1994), Müller-Lyer illusion (Mack, Heuer, Villardi, & Chambers, 1985), and Roger Shepherd's Impossible Elephant (Shepard, 1990). There were two priming symbols in each experimental treatment, apart from the control treatment that had none. The symbols used for the secular treatment were (1) images of four ethnically black (two males and two females) and three ethnically non-black (two males and one female) scientists in a laboratory with a discursive sign that reads "Question everything" and "Separate fact from fiction" and (2) a red stop sign with the words "stop and think". The symbols used for the benign Christian treatment were (1) a depiction of Jesus Christ, and (2) a crucifix with the word "Christ".

The symbols used for the punitive Christian treatment were (1) a figure in flames with the caption “Hell”, and (2) a symbol with the words “Hell is real”. See Figures 6, 7, and 8 for examples of the symbols utilized in each of the benign religious, punitive religious, and secular treatments, and Appendix Dfor all the symbols utilized.

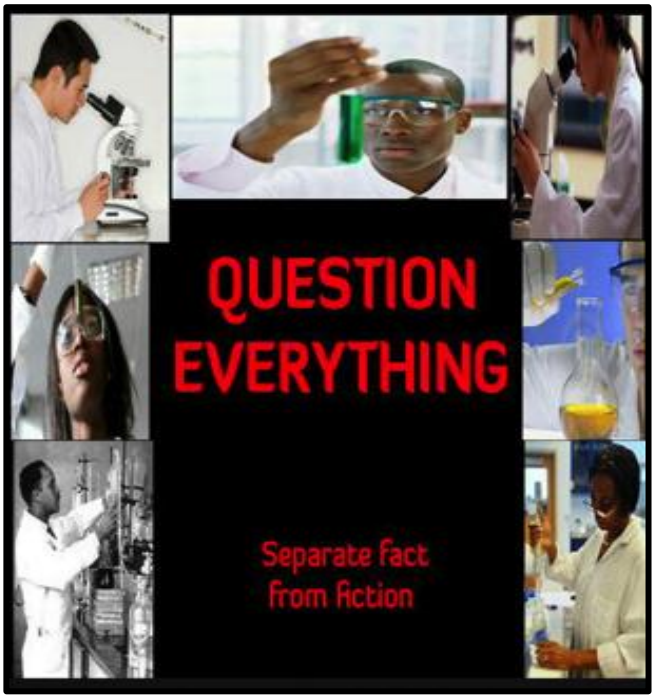


Figure 6.Example of secular symbol.

Figure 7.Example of benign religious symbol.

*Figure 8.*Example of punitive religious symbol.

The Rational Experiential Inventory (REI-40; Pacini & Epstein, 1999) served as the main source for composing the nine-item five point RRII scale (1 = strongly agree, 5 = strongly disagree). The REI-40 was specifically designed to measure preferences for the processing of information, based on Epstein's Cognitive-Experiential Self-Theory. REI-40 assesses the distinction between a rational and experiential preference for information processing. However, the present research was specifically interested in religiosity-related inferential irrationality, therefore some items were modified, some omitted, and new items were added to suit this purpose. Two items that were directly lifted from the REI-59 without modification include "I generally prefer to accept things as they are than to question them" and "It is enough for me that something gets the job done. I don't care how or why it works" (See Table 3). This method of starting a questionnaire based on a previous and widely used measure is not uncommon, for instance, in the development for a new assessment of epistemological beliefs, Ordoñez, Ponsoda, Abad, and Romero (2009) selected items from Bendixen, Schraw, and Dunkle (1998) and Schommer (1990, 1993, 1998).

During the RRII scale development, two items were considered problematic because they did not load onto the same component as the other items in the scale. These items were "It is not important to prove the things we believe and have faith in" and "it is not important to try to understand every single thing around us". They were included, pending further analysis, because of their face

validity and relevance to the analytic vs. intuitive dual-process distinctions. These two items also did not load onto the same component as the other seven items in the present analysis. The RRII scale is conceived as one-dimensional, all seven items loaded onto the same component, apart from the two previously noted items. Therefore, to comply with the one-dimensional conceptualization of the RRII scale, these two items were excluded before the main analysis was carried out.

Reliability of the 7-item RRLI questionnaire

To check for internal consistency of the retained items in the RRLI questionnaire, Cronbach's alpha was computed. The results indicate a good internal consistency with an alpha value of $\alpha = .75$ ($p = .95$), and the least correlated item in the scale was $r = .40$ (See Table 3).

Validity of the 7-item RRLI questionnaire

The minimum amount of data required to conduct factor analysis was met, with a sample size of 123 for 7 items, providing a ratio of at least 17 cases per variable. All 7 items correlate with a minimum of .4 with at least one other item, and the Kaiser-Olkin measure of sampling adequacy was .69, above the recommended value of .6. Further, Barlett's test of sphericity was significant ($\chi^2 = 169.78$, $df = 21$, $p<0.001$), therefore, factor analysis was considered suitable.

In the PCA of the RRLI questionnaire in the pilot study (see Appendix A for the initial development of the questionnaire), the items were reduced to provide a one-dimensional assessment of cognitive orientation toward or away from RRLI following experimental manipulation. A principle axis factoring (PAF) was carried out on the final 7-items to assess if they all loaded onto a single factor in order to justify computing all the variables into a single composite score to test the hypotheses of the main study. The PAF of the final 7-item RRLI questionnaire, using the oblimin rotation, because the items are correlated, showed only one factor passed the Kaiser rule, with an eigen value of 2.79 explaining 39.9% of the variance, the Cattell scree test also suggests one factor, with loadings

ranging from .48 to .59. See Table 3. Both the internal consistency and validity assessments justify combining the 7- items of the RRLI questionnaire into one composite, this composite was used as the DV (1) in the analysis of the main study.

Table 3

Items, Item-Scale Correlations and Factor Loadings of the Seven-Item RRII Scale

Item	Item-Scale Correlation	Factor Loading
1. Faith and belief are more important than logic and reason.	.47	.56
2. Accepting the events in your life by religious faith is better than reasoning out the causes of the events.	.50	.58
3. Natural disasters are an act of God to punish sinful nations.	.44	.52
4. Some dreams can predict the future.	.45	.53
5. The truth of existence is revealed in the holy religious books and no scientific endeavour can prove these facts wrong.	.40	.48
6. I generally prefer to accept things as they are than question.	.47	.57
7. It is not right to question anything written in any of the holy books such as the Bible or Quran.	.50	.59

Design

A trend analysis of variance (ANOVA) was conducted to compare the situational influence of the symbols (punitive religious, benign religious, secular, and no symbol) on RRII scores.The independent variable (IV) was type of symbolism with four levels: punitive Christian, benign Christian, secular, and control treatment (no symbol). The dependent variable (DV) was RRII.

Procedure

The visual illusions used for the distraction tasks were placed about 6ft off the ground, on different walls of the laboratory, and remained in the same position through the different experimental treatments. The frames containing the priming symbols were placed on two sides of the wall above and away from the distraction tasks. The contents of the frames varied according to experimental treatment. Participants were randomly assigned to the different treatments. Upon arrival, participants were given a funnelled briefing; it was important that they did not become aware of the nature of the study until after completion (see Bargh, Chen, & Burrows, 1996). After informed consent was obtained, participants were asked to determine the contents of the visual illusions; none of the priming symbols were pointed to or mentioned. Immediately after completion, participants were asked to help fill in an unrelated measure for a different study (i.e., the RRIl scale). Demographic information such as gender, level of education and religious affiliation were taken afterwards. Finally, the participants were probed regarding whether they thought anything had influenced their responses to the RRIl measure; this was necessary to ensure that they were unaware of the priming influence of the symbols (see Bargh et al., 1996). Participants were then fully debriefed and the visual illusions were explained to them.

5.3 Results

The control variables religious affiliation and level of education were measured as categorical variables, however each of the categories in the variables were dummy coded and a two tailed Pearson correlation analysis was conducted between each category and the dependent variable (RRIl score). None of the types of religion and levels of education were significantly correlated with RRIl scores. Therefore, religious affiliation and level of education were excluded as control variables in the rest of the analysis.

Hypotheses Test: Situational influences of symbols on RRII Scores

A trend analysis of variance (ANOVA) was conducted to compare the situational influence of the symbols (punitive religious, benign religious, secular, and no symbol) on RRII score. Levene's test was not significant (p = .10), indicating that the assumption of homogeneity of variance was not violated. There was a significant effect of situational influence on RRII scores, $F(3,119) = 8.23$, $p <$ .001. There was a significant linear trend, (1,119) = 23.25, $p <$ .001, indicating that RRII score increased linearly from the secular treatment to the control treatment to the benign religious treatment, and to the punitive religious treatment.

Three post-hoc tests using Bonferroni adjusted alpha levels of .017 (.05/3) were carried out to compare RRII scores of participants primed with secular symbolism and participants in the other conditions. In comparison with participants exposed to secular symbolism (M =19.35, SD = 4.51), participants exposed to punitive religious symbolism (M =24.56, SD = 5.49) had significantly higher RRII scores $p <$ .001, 95% CI [-8.49, -1.92], with an effect size of d = 1.04. In comparison with participants exposed to secular symbolism participants exposed to benign religious symbolism (M =24.13, SD = 3.63) had significantly higher RRII scores p = .001, 95% CI [-8.09, -1.46], with an effect size of d = 1.17. However, in comparison with participants exposed to secular symbolism, participants not primed with any symbols (M = 21.03, SD = 5.57) did not have significantly lower RRII scores p = .10, 95% CI [-5.05, 1.69], with an effect size of d = .33. See Figure 9

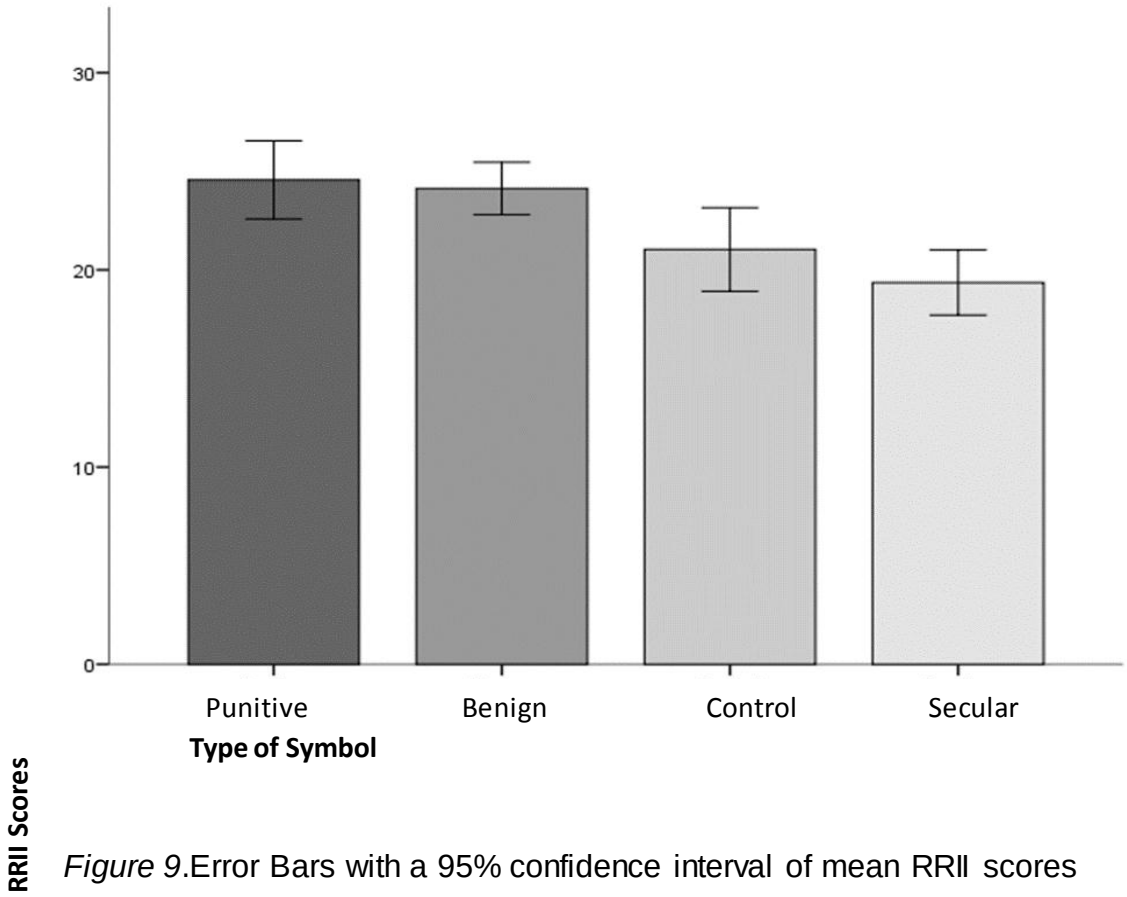


Figure 9.Error Bars with a 95% confidence interval of mean RRII scores according to type of symbol participants were exposed to.

5.4 Discussion

The results of Study Two supported the linear trend prediction that participants exposed to secular symbolism will have the lowest RRII scores followed by participants not exposed to any symbolism (control), followed by participants exposed to benign religious symbolism, and lastly, participants exposed to punitive religious symbolism will have the highest RRII scores. The results of Study Two carried out in Nigeria, replicated the general findings of previous studies carried out in different countries which report a significant influence of religious priming on self-reported religiosity. For instance, Ramsay, Pang, Shen, and Rowatt (2013) showed a significant religious priming effect on attitude toward outgroups with Singapore students, and Saroglou, Corneille, and van Cappellen (2009) reported a significant increase in submissiveness when participants from a Belgian university were primed with religiosity.

These findings are interpreted through the default-interventionist dual-process framework, which posits that the inferences and conclusions generated by default Type I cognitive processes influence and can constrain Type II cognitive processes (Evans, 2007; Evans & Stanovich, 2013a). Type I cognitive processes are prone to effects of religiosity priming (e.g., Aveyard, 2014; Tracy et al., 2011), and self-reported measures such as the RRII scale are filled in through conscious and controlled effort required for reading and understanding. In the secular treatment, it can be argued that the icons primed participants' Type I cognitive processing to generate a substantial amount of sceptical inferences and conclusions that their Type II cognitive processing acted on when responding to the RRII scale. Similarly the benign Christian icons would have primed participants' Type I cognitive processing to generate more religious inferences and conclusions that their Type II cognitive processing acted on when responding to the RRII scale. Finally, the punitive Christian icons would have primed participants' Type I cognitive processing to generate more religious inferences and conclusions that include supernatural punishment, which their Type II cognitive processing acted on when responding to the RRII scale.

Argumentative theory (Mercier & Sperber, 2011a, 2011b; Mercier, 2011a, 2011b, 2011c, 2011d) and Baumard and Boyer's (2013) modified dual-process model, under the unifying framework of the default-interventionist dual-process approach (Evans, 2007; Evans & Stanovich, 2013a), offer more explanatory power for the relationship between religious belief and rational thought for studies carried out in both WEIRD and non-WEIRD nations. For instance, it can be argued that in WEIRD nations that have a conspicuous secular worldview alongside a religious worldview, when individuals respond to religious questions, the inferences generated by their Type I cognitive processes might include secular as well as religious inferences. Further, in these WEIRD nations, the more inferentially rational individuals will use their Type II cognitive processes to justify and/or argue in favour of the secular over the religious inferences, while the less inferentially rational individuals will depend on the experiential/heuristic inferences generated by their Type I cognitive processes, or use their Type II cognitive processes (e.g., functionally or epistemologically) to justify the religious inferences generated by their Type I cognitive processes.

Similarly, it can be argued that, depending on individual learning and exposure, in highly religious nations that have only a conspicuous and normative religious worldview, both the more inferentially rational and the less inferentially rational might arrive at the same conclusions, albeit through different cognitive processes (i.e., through Type II for the former, and through Type I for the latter).

Pennycook et al. (2013) advance that results such as theirs and those of the present study, which demonstrate the effect of situational influences on religious belief, suggest that religious beliefs are to a certain extent re-evaluated upon consideration. The present study adds that the particular inferences and conclusions generated by default Type I cognitive processes can vary, and it is these outputs that influence how individuals use their Type II cognitive processes to consciously consider their response to religiosity measures.

One limitation of Study Two is that even though no participant reported being influenced by the supraliminal primes (i.e., the symbols) when probed, the laboratory room was a confined space. In the confined space, participants would have noticed the symbols and their self-reported RRIl may have been motivated by social desirability considerations.Although this limitation could have been overcome through the use of subliminal priming, the present thesis is interested in the situational influences of visible symbols, particularly how visible religious symbols in highly religious country of Nigeria reinforces religious belief; therefore, supraliminal priming was used.

It is worth noting that religious symbolism can be found in most homes and work environments in Nigeria, as well as on shopping bags, car plate numbers, stickers, etc. (Chiluwa, 2008; Ogunnike, 2013). In the next empirical chapter (Study Three) this limitation was addressed by carrying out the experiment on a busy street with numerous distractions such as traffic, pedestrians, street hawkers, and other symbols. It was intended that presentation of the primes in a crowded public space, as opposed to in the experimenter's laboratory, would help reduce the connection between the experimenter and the primes, and thus help address the social desirability limitations of Study Two.

CHAPTER 6

Study Three

6. A Default-Interventionist Approach to the Rationality vs. Religion Debate (Real Life Setting)

6.1 Introduction

Study Three replicated Study Two, however, while Study Two was carried out in a controlled laboratory setting, Study Three was carried out in a real-life setting. Experiments carried in controlled laboratory settings have numerous advantages, however, real-life setting experiments offer an extra advantage that laboratory experiments do not, that is, the ability to generalize results beyond the laboratory setting. The need to carry out a real-life setting experiment was of particular interest to the present thesis, because of the focus on the (non-conscious) influence of visible religious symbols in Nigeria. Nigeria is a highly religious society and religious symbols are prevalent all over the country (Adeboye, 2012; Chiluwa, 2008; WIN-Gallup, 2012). To what extend can the results of Study Two be generalized outside the laboratory? Will the same trend observed in Study Two be found in a real-life setting experiment?

The link between religiosity and non-conscious automatic processing has led to a series of studies investigating the role of analytic cognitive processing in religious disbelief (e.g., Aarnio & Lindeman, 2007; Buzdar, Ali, & Tariq, 2015; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2014; Shenhav, Rand, & Greene, 2011; Siddiqa, 2010). Shenhav et al. (2011) showed through the cognitive reflection test (CRT; Frederick, 2005) that individual differences in cognitive style predict belief in God, with participants (mostly US residents) showing an inverse relationship between cognitive style and belief in God. Pennycook et al. (2014) propose that individuals who are more analytic are also less religious because they are more sensitive to the conflict between their observation of the natural world and their immaterial religious beliefs. Pennycook et al. further propose a specific

cognitive mechanism, termed “conflict detection”, as being responsible for this process.

The CRT measures the tendency for a reflective versus intuitive response in individuals. It is comprised of three mathematical questions that are worded to appear complex but require no mathematical expertise. The key to answering the CRT questions resides in how the questions are conceptualised. For instance, consider one of the three questions, “In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?” A quick intuitive response might be to divide 48 by 2 (i.e., 24 days to cover half the patch if it takes 48 days to cover the entire patch). However, if this answer is reflected upon, one will realise that that will mean the patch will double in size to fill the lake on the 25th day. The answer, therefore, is 47 days because the patch doubles in size the next day. Studies that have shown an inverse relationship between cognitive ability and religiosity typically measure cognitive ability (e.g., through the CRT; Pennycook et al., 2012, 2013; Shenhav et al., 2011) before assessing if it predicts religiosity. However, it is not clear if priming analytical thinking through secular symbolism will significantly increase cognitive ability in comparison with priming religiosity. Therefore, Study Three utilized the CRT to test the extra prediction (not tested inStudy Two) that analytical-related secular primes will increase cognitive ability in comparison with religious primes.

As with Study Two, it was also predicted that: 1) there would be a trend in non-analytic religiosity scores, such that in ascending order, participants primed with secular symbolism are expected to score the lowest, followed by participants in the control condition, followed by participants primed with benign religious symbolism, and lastly, participants primed with punitive religious symbolism are expected to score the highest. 2) In comparison to participants primed with secular symbolism i) participants primed with benign religious symbolism will have higher RRIl scores, ii) participants primed with punitive religious symbolism will have higher RRIl scores, and iii) participants not primed with any symbols will have higher RRIl scores.

6.2 Method

Participants

There were 238 participants (male = 195, female = 43), aged 18 - 60 years (*M*= 29.72, *SD* = 6.68). The majority of the participants were Christians (198), followed by Muslims (35), practitioners of an indigenous Nigerian religion (3) and non-religious (2). Most were graduates (132), followed by undergraduates (48), postgraduates (31), and O Level holders (27).

Ethical Considerations

The study was reviewed and approved by the Brunel University Research Ethics Committee. All participants were given a written informed consent sheet before participating in the study. Upon completion of the study all participants were fully debriefed and given an information sheet that summarised the purpose of the study and contained references to similar studies.

Materials

The priming icons and distraction tasks were the same as those used in Study Two, apart from the Hermann grid which was replaced with the Ebbinghaus illusion, because the reflection from the sun affected its visibility. There were two priming icons in each treatment; one was printed on a t-shirt worn by the experimenter's confederate and the other was attached to the back of a clipboard carried by the experimenter. See Figures 10, 11, and 12 for examples of the icons utilized and Appendix Dfor all the icons utilized.The three item Cognitive Response Test (CRT) which measures the tendency for a reflective versus intuitive response.

Figure 10.Example of secular symbol.

Figure 11.Example of benign religious symbol.

Figure 12.Example of punitive religious symbol.

Design

A trend analysis of variance (ANOVA) was conducted to compare the situational influence of the symbols (punitive religious, benign religious, secular, and no symbol) on RRII scores. The independent variable (IV) was type of symbolism with four levels: punitive Christian, benign Christian, secular, and control treatment (no symbol). The dependent variables (DVs) were RRII score and CRT score. The control variables were type of religion and level of education.

Procedure

The study was carried out on a busy street of Abuja, the capital of Nigeria. The laminated A4 distraction tasks were pegged on a fence/tree behind the experimenter. Respondents were approached to help participate in a psychology experiment; those who agreed were given an informed consent form. At this point the experimenter's confederate approached wearing a t-shirt

containing the experimental prime which differed according to treatment. The experimenter thanked the confederate for stopping and asked him to kindly wait. After signing the consent form participants were engaged in the distraction task; they were asked to describe the visual illusions and their responses were written down on the clipboard held in a manner that ensured the back of the clipboard, containing the second icon, was within the sight of the participant (see Alter & Kwan, 2009). Participants were then asked to help fill in the RRIl scale and CRT as part of a different study. Demographic details were taken afterwards, including age, religion, and level of education. Participants were asked if they thought anything had affected their response to the distraction tasks, the RRIl scale and the CRT afterwards; all participants reported that nothing had affected their responses. Finally, participants were given the answers to the visual illusions, and fully debriefed on the purpose of the study. See Figures 13 and 14 for depictions of the presentation of the clipboard board prime to participants while they responded to the distraction task. See Appendix Efor more depictions.

Figure 13.Presentation of prime during the distraction task.

Figure 14.Presentation of prime during the distraction task.

6.3 Results

Reliability analysis of the seven-item RRIl scale revealed a Cronbach's alpha of .60. The control variables type of religion and level of education were measured as categorical variables, however each of the categories in the variables were dummy coded and a two-tailed Pearson correlation analysis was conducted between each category and the dependent variable (RRIl). None of the types of religion were significantly correlated with RRIl. Therefore, type of religion was excluded as a control variable. Some of the levels of education were correlated with both RRIl scores CRT scores.

There was a significant positive correlation between O Level holders and RRIl scores, r (236) = .19, p = .004. There was a significant negative correlation between graduates and RRIl score, r (236) = -.18, p = .007. There was a significant positive correlation between postgraduates and the CRT, r (236) = .20, p = .002. Therefore, O Level holders and graduates were controlled for in the set of hypotheses for the situational influences of symbols on RRIl scores, and postgraduates were controlled for in the set of hypotheses for the

situational influences of symbols on CRT scores.

Situational influences of symbols on RRII

A trend analysis of covariance (ANCOVA) was conducted to compare the situational influence of the symbols (punitive religious, benign religious, secular, and no symbol) on RRII scores. Levene"s test was not significant (p = .28), indicating that the assumption of homogeneity of variance was not violated. There was a significant effect of situational influence on RRII score, $F(3,232)$ = 7.00, p< .001. There was a significant linear trend, p< .001, 95% CI [1.34, 3.50], indicating that RRII increased linearly from the secular treatment to the control treatment to the benign religious treatment, and to the punitive religious treatment. There was no significant effect of the covariate O Level on RRII scores, $F(1,232)$ = 1.88, p = .172. There was no significant effect of the covariate Graduate on RRII, $F(1,232)$ = 1.62, p = .204.

Three post-hoc tests using Bonferroni adjusted alpha levels of .017 (.05/3) were carried out to compare self-reported RRII scores of participants primed with secular symbolism and participants in the other conditions. In comparison with participants exposed to secular symbolism (M = 22.30, SD = 4.26), participants exposed to punitive religious symbolism (M = 26.02, SD = 3.90) had significantly higher RRII scores, p < .001, 95% CI [-5.36, -1.25], with an effect size of d = .91. However, in comparison with participants exposed to secular symbolism participants exposed to benign religious symbolism (M = 23.90, SD = 3.97) did not have significantly higher RRII scores p = .340, 95% CI [-3.47, .57], with an effect size of d = .39. Similarly, in comparison with participants exposed to secular symbolism, participants not primed with any symbols (M = 22.95, SD = 4.47) did not have significantly higher scores p = .100, 95% CI [-2.57, 1.48], with an effect size of d = .15. See Figure 15

Situational influences of symbols on the CRT

Most of the participants in all the experimental treatments scored zero on the CRT which made the data zero-inflated, skewed, and unfit for parametric analysis. A nonparametric rank analysis of covariance (Quade, 1967) was conducted to assess the situational influence of symbols (punitive religious,

benign religious, secular, and no symbol) on participants" CRT scores, while controlling for level of education. There was no significant effect of situational influence on CRT score, $F(3,234) = .95$, $p = .42$.

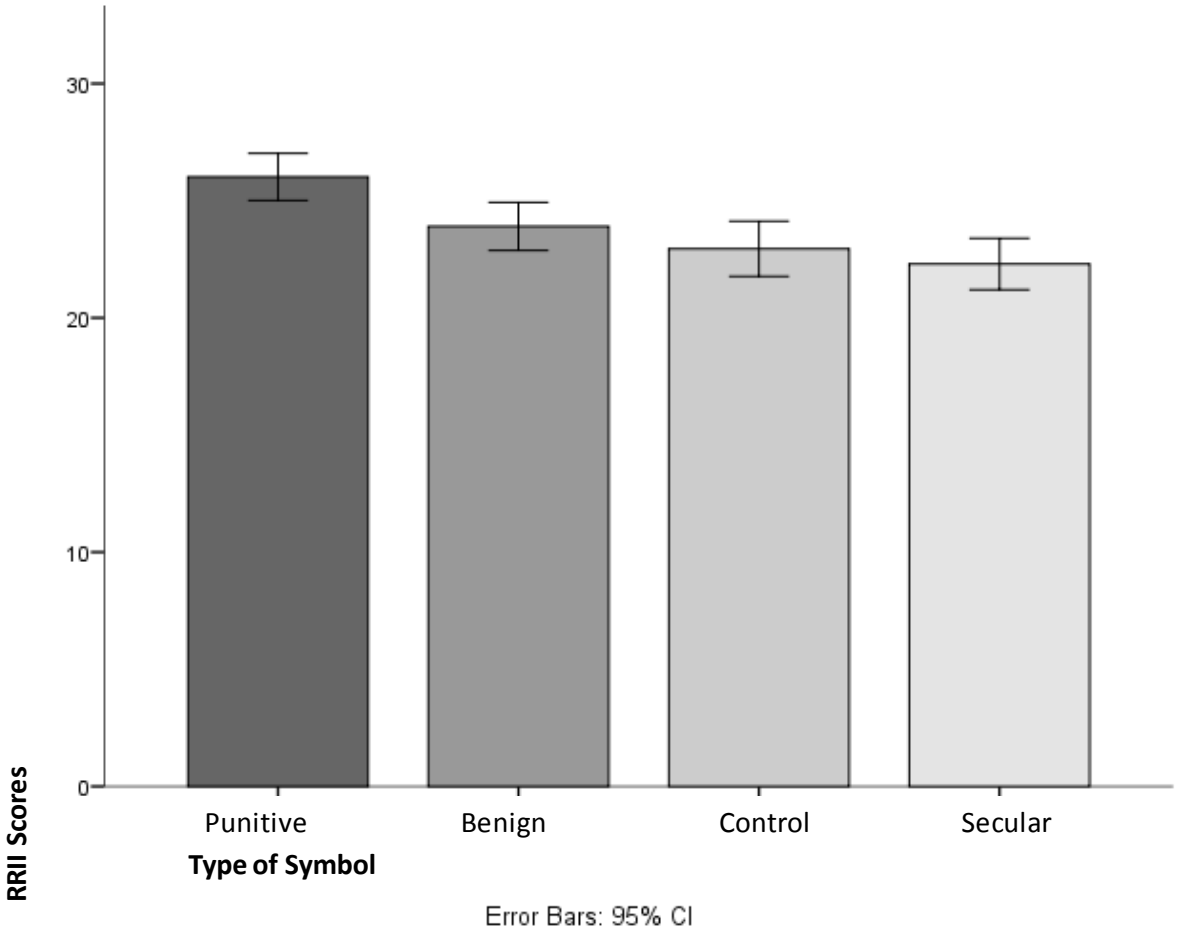


Figure 15.Error Bars with a 95% confidence interval of mean RRII scores according to type of symbol participants were exposed to.

6.4 Discussion

Study Three replicated the trend found in Study Two, and the difference in RRII scores between participants exposed to secular symbolism and participants exposed to punitive religious symbolism. However, the difference in RRII scores between participants exposed to secular symbolism and participants exposed to benign religious symbolism found in Study Two was not replicated. Participants struggled with the CRT questions and only one participant got all three questions correct (he was in the benign religious treatment). It might be that the

Nigerian population sample was not familiar with the CRT-type questions. Unsurprisingly, Quade"s (1967) nonparametric rank analysis of covariance failed to show a significant situational influence of symbols (secular, benign religious, punitive religious, and no symbol) on CRT scores. Unlike Study Two, level of education had a significant effect on RRII scores in Study Three, as well as on CRT scores. However, since the CRT scores were not significantly different among the experimental treatments, it demonstrates that in this particular study the religious and secular icons did not inhibit or improve cognitive response/ability.

Benign religious symbols are common on the streets of Nigeria (Chiluwa, 2008; Ogunnike, 2013), which might explain the difference in results between the laboratory study and the real-life setting study. Participants in the present study (i.e., the real-life setting) might have been primed by the benign religious symbols on the streets of Nigeria prior to participating in the study. Consequently, only the punitive religious experimental treatment was potent enough to significantly influence the inferences and conclusions produced by participants' Type I cognitive processes, which in turn influenced how they used their Type II cognitive processes to respond to the RRII scale.

The results of both studies Two and Three support the argument that religious belief need not be viewed as synonymous with Type I cognitive processes or irrationality, because it is important to separate the cognitive process of rational thought from the content that is rationally processed (Linde, 2013) which can be religious or secular. In both studies Two and Three, when participants' Type II rational cognitive processing of the RRII scale was experimentally manipulated to be fixated on secular inferences and conclusions generated by their default Type I cognitive processes, they scored lower on the RRII scale. Similarly, when participants' Type II rational cognitive processing of the RRII scale was experimentally manipulated to be fixated on religious inferences and conclusions generated by their default Type I cognitive processing, they scored higher on the RRII scale. These differences in RRII scores were significant when the secular treatment was contrasted with both religious treatment in Study Two, and only the punitive religious treatment in Study Three.

One unavoidable limitation across both Study Two and Study Three is the unequal effect strength of the two icons intended to be diametrical (i.e., religious vs. secular); religious primes are well established, unlike secular primes, particularly in Nigeria. To address this shortcoming, descriptive text was used in the secular icons (e.g., 'stop and think'); this instruction, however, is fairly content-free and could imply either 'stop and think about the rationality of religious claims' or 'stop and think about the irrationality of religious claims' for instance. To address this issue, the secular icons were contextualised with relevant images (e.g., an image of scientists in a lab looking through microscopes). The Cronbach alpha of the RRIl scale used for Study Three was low (.60) and couldn't be improved by deleting any items, this indicates a limitation in the reliability of the RRIl scale. Therefore the results of Study Three should be interpreted with caution.

Both Studies Two and Three shed light on three important points in the rationality vs. religion debate. First, religious belief can be rational, for example, if viewed epistemologically (Frances, 2015) or in a non-positivist manner (Linde, 2013). Therefore, it is important to isolate the particular facet/s of rationality in the design of studies in a similar manner to the present study, which isolated religiosity-related inferential irrationality as the rationality facet of interest. Second, it is important to not conflate cognitive contents with cognitive processes (Linde, 2013); rational thought in general is a cognitive process while religious and secular beliefs are contents or items which can be processed by rational thought. Lastly, critics have wondered how the religious can be termed irrational when some of the most analytical minds in the past have been religious. For instance, Ball (2012) wonders how Thomas Aquinas, Immanuel Kant, and George Berkeley, all of whom he claims are religious, can be termed irrational. Dosdad and Manrique (2015) argue that Copernicus, Kepler, Galileo, Newton, Boyle, Bacon, and Descartes were all scientific revolutionaries and claim that they were also all religious. Through the default-interventionist dual-process approach presented here, religious belief is not generalised as synonymous with rationality-devoid Type I cognitive processes. The questions that should be asked are, what inferences and conclusions are being fed to the

individual's Type II cognitive processes by his/her default Type I cognitive processes? And what situational conditions influence the particular inferences and conclusions generated by an individual's default Type I cognitive processing? The scientific revolutionaries mentioned above have bodies of work that prove the quality of their ability to think rationally. They also lived in societies in which religiosity levels were not unlike those of the Nigerian society investigated here.

CHAPTER 7

Study Four

7. Reasoning by Analogy: Inference of Retrograde Immortality by Priming Future Immortality in Nigerian School Children

7.1 Introduction

Conceptualization of future immortality (i.e., life after death) reveals intuitive patterns of reasoning about the enduring qualities of personhood (Bering, 2002; Bering & Bjorklund, 2004). Cultural/religious narratives however often inform responses to questions on future immortality, even in studies carried out with children (Astuti & Harris, 2008; Harris & Giménez, 2005). To address this shortcoming, Emmons and Kelemen (2014), in a cross-cultural study (urban Ecuador and rural Shuar) assessed children's conceptualization of retrograde immortality (i.e., life before birth). This novel approach reduces the chances of culturally acquired responses in children in societies with no dominant retrograde immortality script. Nonetheless, religious situational influences that prime future immortality might still affect how individuals express their belief in retrograde immortality, even in studies carried out with children. The present study was carried out in Nigeria which has a dominant future immortality worldview, sanctioned by Islam and Christianity (Isanbor & Ekiugbo, 2014) and also by various indigenous religions (e.g., Adamolekun, 1999). Through children's ability to reason by analogy (Richland, Morrison, & Holyoak, 2006) it was hypothesized that exposure to a religious future immortality prime (crucifix) will lead children to express more belief in retrograde immortality when compared with children exposed to a secular prime.

When faced with novel phenomena, reasoning by analogy enables children to generate inferences by extracting relevant information based on relational similarity and transferring knowledge across contexts (Chen, Sanchez, & Campbell, 1997; Goswami, 2001; Richland, Morrison, & Holyoak, 2006). The cognitive mechanism responsible for the ability of children to make analogies

has been argued to underlie the development of all cognition (Hofstadter, 2001), and to be paramount for enabling children to comprehend the world (Thibaut, French, & Vezneva, 2010). Although studies have demonstrated reasoning by analogy in children as young as 18 months (e.g., Chen, Sanchez, & Campbell, 1997), competency is not attained until adolescence (Richland, Morrison, & Holyoak, 2006). Just as important as developmental changes, however, is the knowledge base of the child. For instance, if problem set B requires inferences from problem set A, an individual without knowledge of problem set A would not be able to make the correct inference for problem set B, regardless of age. The above is informed by the relational primacy theory (Gentner & Rattermann, 1991; Goswami, 1992; Lindsey & Burchinal, 2013), which posits that satisfactory knowledge is imperative for reasoning by analogy.

It is estimated that about 93% of all Nigerians practice either of the two world dominant doctrinal religions, Christianity and Islam (Chiluwa, 2012; Mandryk & Johnstone, 2001). Most denominations of Christianity and Islam validate future immortality and have no retrograde immortality script (with the exception of Mormonism). Children in Nigeria become acquainted with Christianity and/or Islam from a very young age, and like adults are exposed to religion through all popular forms of media and schooling (Adeboye, 2012; Marquette, 2012; Taiwo, 2013). Accordingly, children in Nigeria should possess the prerequisite knowledge of future immortality to be able to reason by analogy about retrograde immortality when primed with religious future immortality.

Harris and Giménez (2005) demonstrated that when Spanish children aged seven to eleven years old were given a religious vs. secular narrative of the death of an elderly person, those in the religious treatment expressed more belief in future immortality. Similar results were obtained by Astuti and Harris (2008) with a Vezo population sample (in Madagascar) consisting of children and adults. Whereas Harris and Giménez (2005) had used “God” and “priest” in the religious narrative and “doctor” and “hospital” in the secular narrative, Astuti and Harris used “corpse” (secular) and “tomb” (religious) as equivalents, according to the Vezo cultural/religious worldview. In both studies, however, it can be argued that the narratives used to prime the participants might be

interpreted as instructions by the participants. For instance, "…The priest came to talk to Sara… your grandmother is with God now" (Harris & Giménez, 2005, p. 8) may have influenced participants in the religious treatment to conceptualise future immortality, because the experimenter validated this conceptualisation by stating that the dead agent was with God (i.e., to continue to exist). To address this shortcoming, the present study investigated how mere exposure to religious symbolism associated with future immortality (vs. secular symbolism), with no explicit narrative, might positively influence expression of belief in retrograde immortality in children, through their ability to reason by analogy. It was predicted that children exposed to religious symbolism will report greater conceptualization of retrograde immortality in comparison with children exposed to secular symbolism, regardless of age.

7.2 Method

Participants

Eighty-eight children (male = 41, female = 47) from a nonreligious school located in Lekki, Lagos; the former capital of Nigeria. The school is located in a predominantly Christian neighbourhood. All participants were Nigerian and were divided into four age groups: 5- to 6-year olds (n = 12), 7- to 8-year olds (n = 23), 9- to 10-year olds (n = 25), and 11- to 12-year olds (n = 28).

Ethical considerations

The study was reviewed and approved by the Brunel University Research Ethics Committee. All participants, the parents of participants, and the head teacher of the school the research was carried out in were given an information sheet and signed a consent sheet before participants participated in the study.

Material and procedure

Participants were assessed in the school administrator's private office. Each participant was assured that there were no right or wrong answers and that they would not be graded on the answers they provided. Participants were also

assured that their teachers would not be informed of their performance, and that they were free to leave anytime they felt like it even though their parents, head teacher and themselves had signed the participation consent sheet approved by the Brunel University Ethics Committee.

After the participants had settled in, an experimental procedure similar to Emmons and Kelemen (2014) was utilized. The present experiment, however, had two different experimental treatments (religious and non-religious). In each treatment, children were presented with three images, each on a laminated A4 sheet. The background of the images differed according to experimental treatment (see Figure 16).

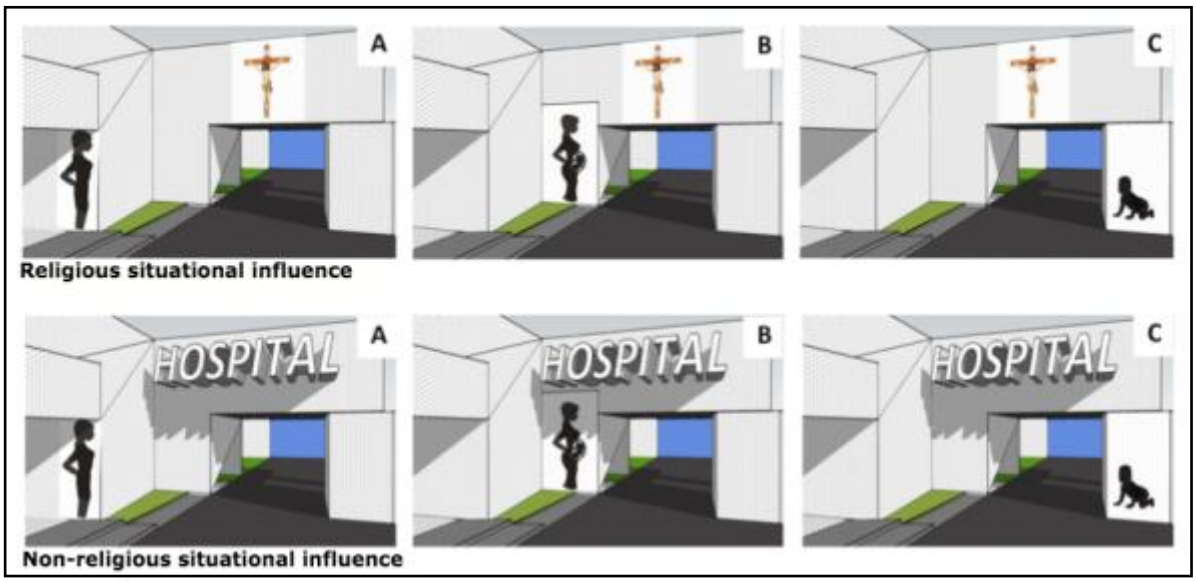


*Figure 16.*Religious and non-religious primes depicting A) pre-life, B) in utero, and C) baby periods.

Panel A represents the pre-life period (to prime retrograde immortality), panel B represents the in utero period, and panel C represents the period after birth. The images were laid out linearly, from A to C; however, panel C was discussed first for clarity. Panel B was discussed next, followed by panel A. During the discussion, the images were pointed to and the participants were asked to imagine that the people depicted represented themselves and their mothers. Panel A (which represented retrograde immortality) was carefully explained to

participants as depicting the period when their mother was young and they had not yet entered her stomach. The depictions were then mixed up and the participants were asked to arrange them linearly (i.e., A-B-C). Most participants, especially the older children, got it right at their first try and all participants got it right after the depictions were explained a second time.

Panels B and C were then removed from the table, leaving only the Panel A (see Figures 17 and 18). Participants were asked a series of 12 "yes-no" questions with Panel A in view. See Table 4 for the list of questions. Similar to Emmons and Kelemen (2014), all questions were preceded by the phrase "Think about yourself during this period when you have not entered your mother's stomach. During that time, could…" Representative questions include "could your heart work?" (biological category) and "could you remember things?" (epistemic category). Each "yes" or "no" response was further probed; a common response to the first representative question was "because my heart was too small" if the initial answer was "no" and "because I am a human being" if the initial answer was "yes".

Figure 17 Presentation of future immortality prime

Figure 18 Presentation of non-religious/secular prime

Initial responses were coded as functional if the participant answered “yes” and non-functional if the participant answered “no”. In some instances, the justification for initial “yes-no” answers overrode their initial functionality score. For example, when asked “… could you be hungry?” (psychobiological category), an initial “no” response coded as non-functional was rescored as functional if when probed, the participant reveals that she could not be hungry “because I have already eaten”. The experimenter and another coder, blind to the hypothesis of the study, coded the responses. Interrater reliability was Kappa = .91, and all disagreements were resolved afterwards by discussion and revisiting the coding criteria used in Emmons and Kelemen (2014).

Table 4

List of Retrograde Immortality Questions

Category	Question
Biological	Could your eyes work?
	Could your heart beat?
Psychobiological	Could you be thirsty?
	Could you be hungry?
Perceptual	Could you watch something?
	Could you listen to something?
Epistemic	Could you think things?
	Could you remember things?
Emotional	Could you feel sad?
	Could you feel happy?
Desire	Could you want anything?
	Could you desire anything?

7.3 Results

In each of the six question categories participants could have a retrograde functionality score of between 0 and 2. Most participants had a score of zero, making the data zero-inflated and therefore skewed and unfit for parametric tests that assume normality. An ordered logistic regression within the GLIMMIX (SAS) mixed-modeling framework was used to estimate the difference between situational influence (religious vs. secular), age group (5 – 6 years, 7 – 8 years, 9 – 10 years, and 11 – 12 years), and question category (biological, psychobiological, perceptual, epistemic, emotional, and desire) on retrograde functionality scores.

Type III Tests of Fixed Effects revealed that situational influence, age group, and question type all had significant main effects on retrograde immortality functionality score: situational influence, $F(1,510) = 29.60$, $p < 0.0001$; age group, $F(3,510) = 5.32$, $p = 0.0013$; question type, $F(5,510) = 7.60$, $p < 0.0001$. There was no significant interaction between situational influence and age group, $F(3,510) = 1.63$, $p = 0.18$, or between situational influence and question type, $F(5,510) = 0.61$, $p = 0.69$. A simple effects comparison of least square means was carried out to assess the specific differences in retrograde immortality score according to situational influence (religious vs. non-religious) across age group (4 levels) and question type (6 levels). A p value criterion of $p = 0.05/10$ was utilized. At $p = 0.005$, there were significant differences between the religious and non-religious situational influence across all age groups apart from children aged between 5-6 years old (see Figure 19 and Table 5).

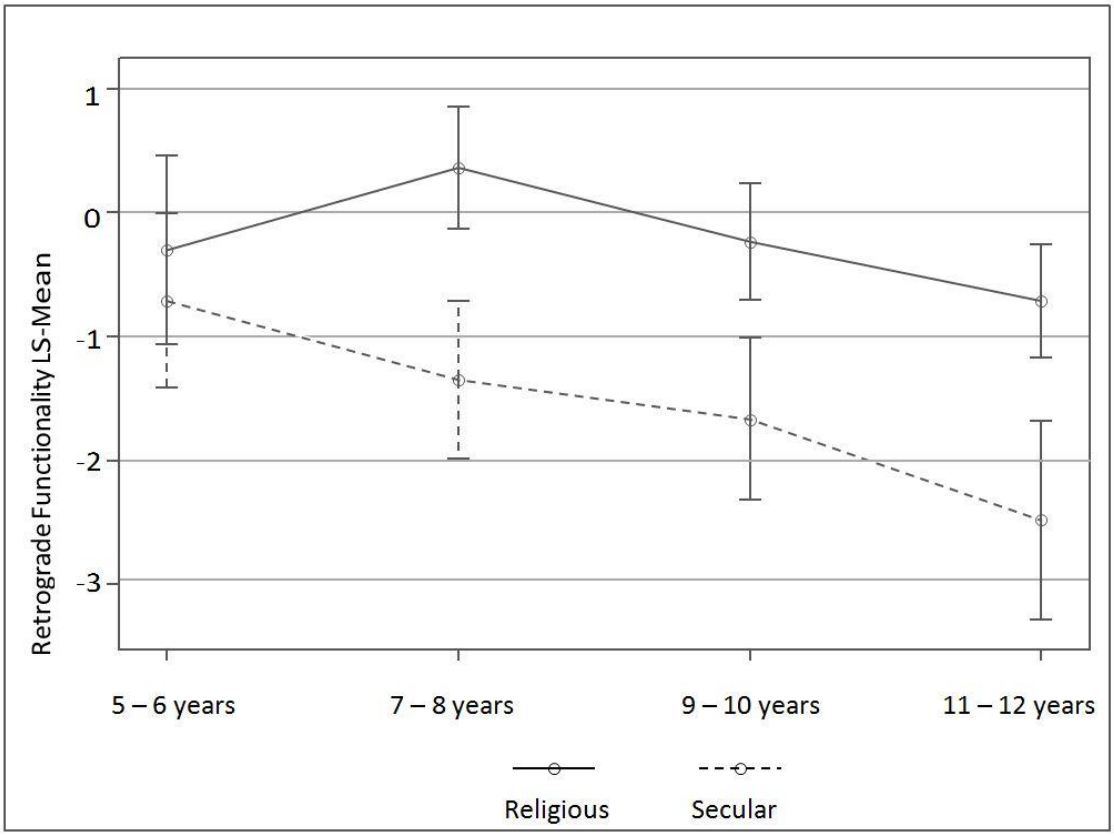


Figure 19.Least squares means of retrograde immortality functionality scores according to situational influence and age group with 95% confidence interval bars.

The results presented above suggest that participants aged between five and six years old were not affected by the situational influences. Further, in Emmons and Kelemen (2014), participants aged between five and six years old were excluded from the study because they could not distinguish the pre-life period from the in utero period. For these two reasons participants aged between five and six years were excluded from the rest of the analysis.

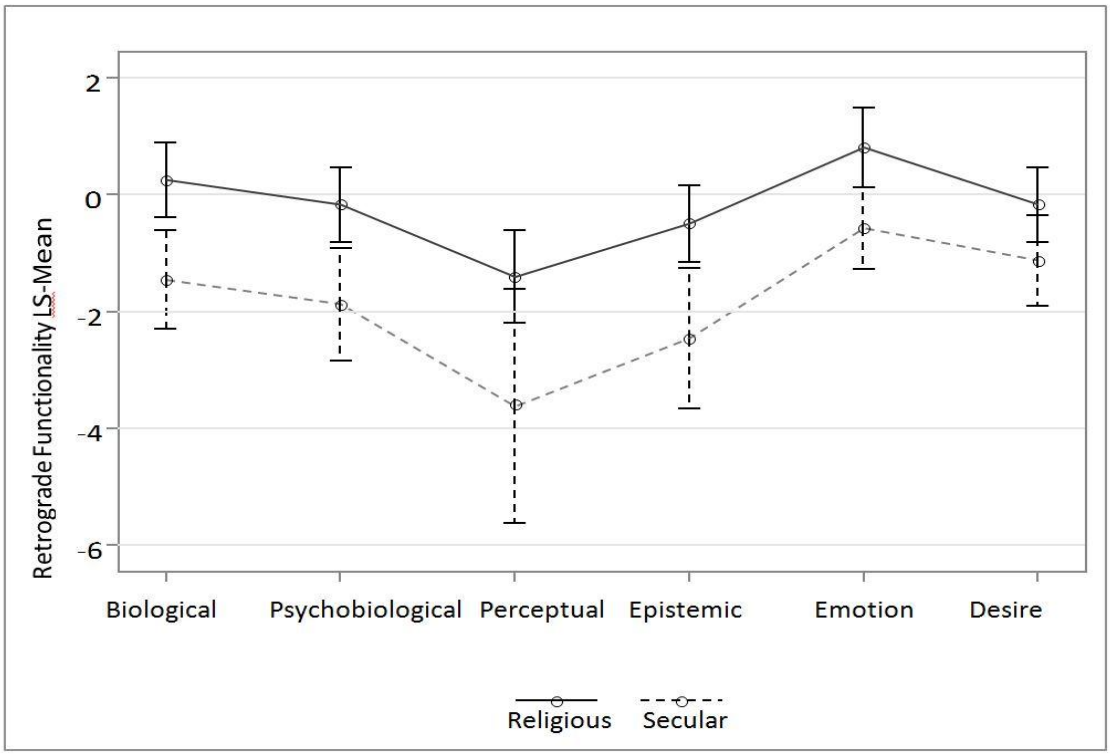


Figure 20.Least squares means of retrograde immortality functionality scores according to situational influence and question category with 95% confidence interval bars.

At p = 0.005 (i.e., 0.05/10), there were significant differences between the religious and non-religious situational influence in two of the three physical question categories (biological and psychobiological). There were no significant differences in any other question category. Bonferroni correction was utilized in Studies Two and Three successfully, however due to the larger number of comparisons being made in the present study, and the resulting significance value (i.e., 0.005), there is an increased tendency for Type II error (McLaughlin & Sainani, 2014). Therefore, a simulation-based method (Edwards & Berry, 1987) was used to correct for familywise error. Under the simulation adjusted p values, at p =0.05, there were significant differences between the religious and non-religious situational influence in all question categories apart from one of the three mental question categories (desire). See Figure 20 for a graphical representation of retrograde functionality scores across question types, and Table 5 for the means, estimates, t values, p values, and simulation adjusted p values.

Table 5

Simple Effect Comparisons of Religious vs. Non-Religious Situational Influences, by Age Group and Question Type.

Simple Effect Level	Mean (SE)		Religious vs. Non-religious Situational Influence			
	Religious	Secular	Estimate (SE)	t Value	*p*	Simulation *p*
Age group (years)						
5 – 6	.43 (.37)	.33 (.36)	0.41 (0.53)	0.77	0.4414	0.4393
7 – 8	.59 (.25)	.21 (.32)	1.71 (0.41)	4.18	<.0001	<.0001
9 – 10	.44 (.24)	.16 (.33)	1.43 (0.41)	3.49	0.0005	0.0005
11 -12	.33 (.23)	.08 (.41)	1.77 (0.47)	3.77	0.0002	<.0001
Question Category						
Biological	.56 (.33)	.19 (.43)	1.71 (0.54)	3.19	0.0015	0.0016
Psycho-biological	.46 (.33)	.13 (.49)	1.70 (0.59)	2.40	0.0040	0.0045
Perceptual	.20 (.40)	.03 (1.02)	2.22 (1.10)	1.99	0.0434	0.0447
Epistemic	.38 (.33)	.08 (.61)	1.96 (0.70)	2.89	0.0050	0.0057
Emotional	.69 (.35)	.36 (.36)	1.38 (0.50)	1.90	0.0057	0.0057
Desire	.46 (.33)	.25 (.39)	0.96 (0.51)	1.72	0.0620	0.0662

Note: Question category figures are only for children aged from seven to twelve years old.

Table 6

Odds Ratio Estimates of Retrograde Immortality for the Religious vs. Secular Groups

Comparison	Estimate	DF	95% Confidence Limits	
Religious vs. Secular Group	3.72	509	2.323	5.952

Justification of Retrograde Immortality Responses

A content analysis of the justification of participants' retrograde immortality functional scores was carried out. Retrograde immortality scores were categorized as "non-functional biological" or "functional biological" when participants gave an explicit biological justification (e.g., reproductive reasons), "non-functional limited" when participants gave reasons that they were not biological (e.g., environmental reasons), "functional fate" when participants gave fate related reason (e.g., destined to be born), "functional social" when participants referenced another member of their social group (e.g., their mother), "functional psychological" when participants referenced another mental state that were not asked about (e.g., responding that they are always happy when asked if they could think), "functional spiritual" or "non-functional spiritual" when participants gave a spiritual/religious reason (e.g., references to God), and lastly, "other" when the justifications could not be categorized (e.g., "I don't know"). See Emmons and Kelemen (2014) for a full description of the codes. The only justification codes of interest in the present study however were the functional and non-functional spiritual codes. The experimenter and another blind coder, blind to the hypotheses of the study, coded the responses, interrater reliability was Kappa = .80, all disagreements were resolved afterwards by discussion and revisiting the coding criteria used in Emmons and Kelemen (2014). An ordered logistic regression within the GLIMMIX (SAS) mixed-modeling framework was used to estimate the difference between situational influence (religious vs. non-religious), age group (7 – 8 years, 9 – 10 years, and 11 – 12 years), and question category (biological, psychobiological, perceptual, epistemic, emotional, and desire) on the justification for retrograde

functionality scores.

Type III Tests of Fixed Effects revealed that situational influence, age group, and question type all had significant main effects on the justification for retrograde functionality score; situational influence, $F(1,878) = 61.71$, $p < 0.0001$; age group, $F(2,878) = 5.84$, $p = 0.003$; question type, $F(11,878) = 8.59$, $p < 0.0001$. There was no significant interaction between situational influence and age group, $F(2,878) = 0.31$, $p = 0.74$, or between situational influence and question type, $F(11,878) = 0.34$, $p = 0.98$.

As the present study was particularly interested in retrograde immortality functionality justifications that were spiritual, a second analysis was run to assess if situational influences had a significant effect on spiritual justifications for retrograde functionality. Justifications coded as "functional spiritual" and "non-functional spiritual" were scored as one and all other codes were scored as zero. Under the religious situational influence, 1.86% of the participants gave spiritual justifications for their retrograde immortality responses (non-spiritual justifications = 50.77%), while under the non-religious situational influence 0.11% of the participants gave spiritual justifications for their retrograde immortality responses (non-spiritual justifications = 47.26%). Chi-square test showed significant difference in spiritual-themed justifications for retrograde immortality responses between participants under the religious and non-religious situational influences, $\chi^2(1) = 12.88$, $p = .0003$, as did the Fisher's Exact Test, $p = .0001$.

Effect of Situational Influences on Consistent Non-functional Theorists

A final analysis was carried out to determine if participants' who had zero (non-functional) retrograde immortality scores across all 12 questions differed according to situational influence. Under the religious situational influence, 11.36% of the participants were consistent non-functional theorists (functional theorists = 39.77%), while under the non-religious situational influence, 18.18% of the participants were consistent non-functional theorists (functional theorists = 30.68%). Chi-square test showed no significant difference in consistent non-

functional theorising between participants in the religious vs. non-religious situational influences, χ^2 (1) = 2.37, p = 0.12.

7.4 Discussion

The present study extended Emmons and Kelemen's (2014) research on the effect of age and question type on children's expression of belief in retrograde immortality, by assessing the role of religious vs. non-religious situational influences. The results presented above show that children aged from seven to twelve years old expressed more belief in retrograde immortality when under the religious situational influence in comparison with the non-religious situational influence. The particular religious prime children were exposed to under the religious situational influence was a depiction of Christian future immortality, and not retrograde immortality. The effect was predicted to occur, however, as a result of children's ability to reason by analogy, that is, to extract relevant information and generate inferences by relational similarity, and to transfer knowledge across contexts (Chen, Sanchez, & Campbell, 1997; Goswami, 2001; Richland, Morrison, & Holyoak, 2006).

Research in both future immortality studies (e.g., Bering 2002) and retrograde immortality studies (e.g., Emmons & Kelemen, 2014) show that as children get older they express less belief in personhood continuity. The results of the present study (see Table 5) consistently mirrored this pattern with children under the religious situational influence (apart from five to six years olds) and with children under the non-religious situational influence. In support of the hypothesis presented in the present chapter, results also show that despite the decrease of expressed belief in retrograde immortality with the increase of age, there were also significant differences in expressed belief in retrograde immortality between participants in the religious vs. non-religious situational influences at all age group levels (excluding five to six years olds). Very young children do not fully comprehend biological reproduction (Bernstein & Cowan, 1975); this was evident in Emmons and Kelemen's study which showed that five to six year olds could not differentiate the pre-life period from the in utero period, and were consequently excluded from the rest of the analysis. Five to

six years olds were also excluded in the present study because the results demonstrated that children in this age group did not show a significant difference between the religious treatment vs. the non-religious treatment, even though the difference was highly significant for all the other age groups (p<.001).

Bering and colleagues show that children are more likely to express belief in the continuation of mental states of personhood (epistemic, emotion, and desire) than physical states (biological, psychobiological, and perceptual). Although studies have generally replicated this distinction in the expression of belief in mental states vs. physical states, there have been particular differences in which states some of the categories belong. For instance, in Emmons and Kelemen (2014) children expressed more belief in only two of the three categories of mental state (i.e., emotions and desire, but not epistemic). In Bek and Lock (2011), a factor analysis showed that the perceptual category did not load onto the same factor as the other physical state categories (i.e., biological and psychobiological) but loaded onto the same factor as the mental state categories. In the present study, the simulation adjusted significance criterion showed that all state categories were significantly different (except desire) between the religious vs. non-religious treatment in the expression of belief in retrograde immortality. However, under the more conservative Bonferroni correction significance criterion, only the biological and psychobiological categories were significant. More research is called for that disambiguates physical state categories from mental state categories, particularly whether the perceptual category belongs in the physical state, mental state, or some other undefined state.

In Emmons and Kelemen's (2014) retrograde immortality study, in which no religious primes were utilized, spiritual justifications for retrograde immortality were rare (Study One = 2%, Study Two = 0%). In the present study, which did utilize religious primes, it was hypothesised that participants under the religious situational influence would have a significantly higher spiritual justification for retrograde immortality than participants under the non-religious situation influence. The content analysis revealed that although there was a lower count

than expected (overall spiritual justification: religious situational influence = 1.86%, non-religious situational influence = 0.11%), there was still a significant difference in spiritual justifications used between participants under the religious vs. non-religious situational influence.

Frameworks that assess the relationship between intuitive cognitive biases and religious acquisition in children propose that children's tendency to think of personhoods as eternally enduring through death (Bering & Bjorklund, 2004; Bering et al., 2005) and before birth (Emmons and Kelemen, 2014) reveals intuitive patterns of reasoning which predispose us to become religious. Bering and colleagues studied children to assess this intuitive pattern of reasoning because of children's lack of exposure to relevant cultural/religious scripts, and also because of their maturing cognitive abilities (evidenced in the result that intuitive conceptualisation of immortality decreased with age). Emmons and Kelemen (2014), in addition to showing the effects of age and question category, utilised retrograde immortality (which is unscripted in most Western religions) to assess children's untutored responses, particularly upon consideration of retrograde immortality for the first time. The present study demonstrated that even when asking children about immortality, and even when the immortality in question is retrograde (as opposed to future), relevant situational influences can still have a significant impact on the way children conceptualize the enduring qualities of personhood.

CHAPTER 8

Study Five

8. Agency Detection, Cognitive Closure, and Religious Fundamentalism

8.1 Introduction

Situational influences that lead to ambiguity and uncertainty are theorised to heighten our bias toward agency detection (Barrett, 2004; Guthrie, 1993) and arouse our need for cognitive closure (NFCC; Kruglanski & Webster, 1996). Individuals who score high on NFCC tend to favour any answer to no answer and to dismiss contradictory information (Kruglanski & Webster, 1996). Religion provides a secure knowledge structure and offers meaning to ambiguous events (Ladd, 2007), which adherents are motivated to hold on to, to buffer distress produced by uncertainty (Inzlicht, Tullett, & Good, 2011). Religious fundamentalists in particular are theorized to generally believe in a return to the foundations of their faith, that the truth criterion of their faith is absolute, and that there is a mutual exchange of commitment between believers and their deity in fulfilling their religious creed (Altemeyer & Hunsberger, 1992; Gribbins & Vandenberg, 2011). Studies have also shown a positive correlation between NFCC and religious fundamentalism (e.g., Brandt & Reyna, 2010). The present study, carried out in Nigeria, however tests the novel hypothesis that agency detection mediates the relationship between NFCC and religious fundamentalism, when individuals are uncertain.

Agency detection is inherent in general perceptual functioning, and its oversensitivity is theorised to lead to anthropomorphism, which is a core characteristic of many religions (Guthrie, 1993). Individuals high in NFCC are prone to accept inferences generated by ubiquitous implicit cognitive systems such as an Hyperactive Agency Detection Device (HADD). Barrett (2004) posits that the HADD is a specific cognitive mechanism that is prone to identify agency even when none exists, and its sensitivity increases when individuals are

uncertain and/or in ambiguous and threatening situations.

Agency detection might point to a supernatural agent (e.g., the Christian God), to a natural agent (e.g., human) or non-natural agent (e.g., artificial intelligence), this conception of a multi-faceted agency detection device is in line with Atran and Norenzayan (2004). The first study presented below (Study Five A) sort to (1) replicate the observed positive correlation between NFCC and religious fundamentalism (Brandt & Reyna, 2010), (2) test the correlation between detection of supernatural agency and human agency. These correlations are hypothesized to be significant in the control condition only and not in the other conditions were participants were primed first (with either secular, benign religious, or punitive religious symbols) before responding to the agency detection measures (both supernatural and natural). Study Five B collected the natural un-primed measures of participants' supernatural and natural agency detection before the presentation of the primes.

In Study Five B secular symbols that promote scepticism were hypothesized to prime religious uncertainty, hence activate NFCC, unlike religious symbols which reinforce the religiosity and provide closure. Under primed uncertainty (i.e., participants exposed to pro-sceptic secular symbols), it was predicted that (1) supernatural agency will positively mediate the relationship between NFCC and religious fundamentalism,and (2) natural (human) agency will negatively mediate the relationship between NFCC and religious fundamentalism.

The casual steps method (Baron & Kenny, 1986) traditionally used in mediation analysis has come under much criticism (Hayes, 2009; 2012, MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). Critics argue the casual steps method increases Type II Error because the indirect effect is inferred, albeit logically, by a set of criteria, rather than a direct test of mediation itself (Hayes, 2012). Simulation studies have also shown that the causal steps method has very low power in comparison with other methods used to test for mediation (e.g., Fritz & MacKinnon, 2007). The present study utilized the bootstrapping method because it requires fewer assumptions than the empirical M-test, and simulation studies show that the bootstrapping method has very high power in

comparison with other methods used to test for mediation (Hayes, 2009).

8.2 Method

8.2.1 Study Five A

Study Five A is a preliminary study to investigate if (1) the reported positive correlation between NFCC and religious fundamentalism (Brandt & Reyna, 2010) will be replicated, and (2) to investigate if detection of supernatural agency and human agency are correlated. These correlations were hypothesized to only occur in the control condition, free of experimental manipulation.

Participants

There were a total of 273 Nigerian participants recruited in Akoka-Yaba, Lagos State. Due to frequent power outages 71 participants did not complete the experiment and were excluded from the analysis. Therefore, the actual number of participants used for the analysis was 202 (Male = 116, female = 81, missing data = 5), with a mean age of 22.1 years (*SD* = 3.75). Most participants were religious (Christian = 156, Muslim = 38, Non-religious = 2, Hindu = 1, missing data = 5). Participants were educated to different degrees (O level = 9, undergraduate = 149, graduates = 29, postgraduates =10, missing data = 5).

Ethical Considerations

The present study was reviewed and approved by the Brunel University Research Ethics Committee. All participants were given a written informed consent sheet before participating in the study. Upon completion of the study all participants were fully debriefed and given an information sheet that summarised the purpose of the study and contained references to similar studies. The same procedure was followed for Study Five B.

Materials

Need for cognitive closure (NFCC). The brief Need for Closure Scale developed by Roets & Van Hiel (2011) was used as a measure of NFCC. The scale was designed based on items from Webster and Kruglanski's (1994) original NFCC scale and the revised version (Roets & van Heil, 2007). The brief Need for Closure scale measures NFCC as a one-dimensional construct and is composed of 15 items measured on a six-point Likert scale from 'completely disagree' to 'strongly agree'. Representative items are "I don't like situations that are uncertain" and "When I have made a decision I feel relieved" (Cronbach's M = 65.98, SD = 11.57, α = .85).

Detection of supernatural agency. The 3-item index of supernatural control (Kay et al., 2010) was used as a measure of detection of supernatural agency. Items were measured on a seven-point Likert item scale (from 'tremendously doubtful' to 'tremendously likely'); representative items are "It is feasible that God, or some type of non-human entity, is in control, at least in part, of the events within our universe" and "The events that occur in this world unfold according to God's, or some other non-human entity's, plan" (M = 14.47, SD = 4.05, α = .67).

Detection of human agency. The numerical judgement task (Valdesolo & Graham, 2014) was used as a measure of detection of human agency. The measure consists of ten number strings composed of a series of 12 randomly computer-generated one's and two's. Participants are asked to determine on a ten-point scale ('definitely random' to 'definitely human') the degree to which they think the numbers were designed by a human agent or by a computer program. Numbers were randomly generated using an online random number generator provided by the webpage Intemodino. Examples of the number strings include "212212222212" and "112111221211". All participants were given the same set of number strings (M = 60.74, SD = 18.64, α = .79).

Religious fundamentalism. The revised religious fundamentalism scale (Altemeyer & Hunsberger, 2004) was used as a measure of religious fundamentalism. The scale consists of 12items and is measured on a nine-point

Likert scale (from 'very strongly disagree' to 'very strongly agree'). Examples include "The basic cause of evil in this world is Satan, who is still constantly and ferociously fighting against God" and "The fundamentals of God's religion should never be tampered with, or compromised with others' beliefs" (M = 74.58, SD = 16.37, α = .74).

Religious (punitive and benign) and secular situational influences. A graphic designer created a series of animations containing the supraliminal primes. The animations were presented as a game that required participants to perform a dual-n-back task (Jaeggi et al., 2003) where independent tasks (visual and auditory) are presented simultaneously to occupy participants' attention, discouraging them from consciously attending to the primes. The task consisted of counting red/black and yellow flowers placed by the windows of houses, as well as the number of doorbells they heard. The animation was a point-of-view sweep of a block of houses, which ended on a large building opposite the block of houses in an upward motion before fading to black. The street that led to the large building and the large building itself differed according to experimental treatment. The punitive religious treatment had two symbols of reminders of hell, one was a lamppost banner with a depiction of Hell with the words "beware of Hell", the other was an animated character holding a placard with the words "Hell is real", the large building was a church called 'House of God' with a crucifix symbol. The benign religious treatment had two symbols, one was a lamppost banner with a depiction of Jesus Christ, the other was an animated character holding a placard with the words "God loves you" and the large building was a church called 'House of God' with a crucifix symbol. The secular treatment had two symbols, one was a lamppost banner with the words "think rationally", the other was an animated character holding a placard with the words "question everything" and the large building was labelled 'Institute of Science and Technology'. In the control treatment, participants engaged in the same dual n-back task but were not exposed to any symbols. All participants engaged in a familiarization dual n-back task that contained no situational influences, the animation was point-of-view sweep that led to the block of houses used for the priming treatments. See Figures 21, 22, and 23 for still frames of the animation and Appendix D for more still frames.

Figure 21.Still frame of secular animation prime

Figure 22.Still frame of benign religious animation prime

Figure 23.Still frame of punitive religious animation prime

Procedure

The study was carried out in an internet café and all the response measures were hosted on Survey Monkey. The animations were also saved on the computers because there were some instances of slow internet connection when the animations had to be played locally (according to experimental treatment).

Participants were asked to assist in a study investigating memory retention and other psychological constructs. Although memory retention was related to the dual n-back task, it was unrelated to the hypotheses of the study. It was important that participants did not become fully aware of the hypothesis of the study until after completion (see Bargh, Chen, & Burrows, 1996). The first identical pages of the information sheet of the secular, benign religious, punitive religious, and control experimental treatments were left open on different computers chosen randomly every day. Potential participants were asked to randomly choose any computer to read the information sheet. Participants then proceeded to (1) the consent sheet, (2) the familiarization dual n-back task and (3) the priming dual n-back task.

Afterwards, participants were asked to help complete questionnaires for another study that included the (4) NFCC, (5) detection of supernatural agency, (6) detection of human agency, and (7) religious fundamentalism measures. Note that the numbers above represent the sequence of presentation of the information sheet, primes, and measures. After the completion of all measures, demographic details were taken and participants were probed for suspicion of knowledge of the priming function of the dual n-back task (see Bargh, Chen, & Burrows, 1996). Participants were then fully debriefed of the complete nature of the study and offered free time to use the internet. See Figure 24 for photographs of participants participating in the study. See Appendix E for more photographs.

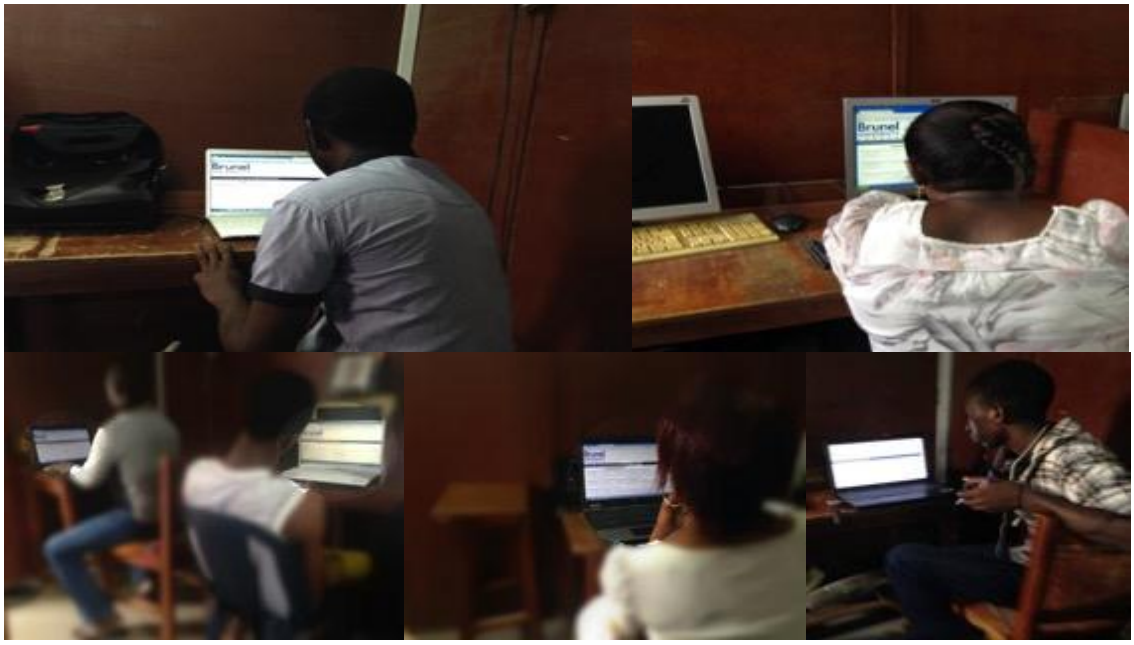


Figure 24.Photographs of participants participating in Study Three.

8.2.1.1 *Results and Discussion*

A Pearson product-moment correlation coefficient was computed to assess the relationship between the Need for cognitive closure (NFCC) and religious fundamentalism, and the relationship between detection of supernatural agency and detection of human agency. NFCC and religious fundamentalism were significantly positively correlated in the control treatment, $r(51) = .31$, $p = .012$.

Detection of supernatural agency and detection of human agency were significantly positively correlated in the control treatment $r(51) = .45$, $p < .001$. The correlations between both NFCC and religious fundamentalism, and between detection of supernatural agency and detection of human agency were not significant in the secular, benign religious and punitive religious treatments (see Table 7).

Table 7

NFCC, DSA, DHA, and Religious Fundamentalism Bivariate Correlations across Treatments

Treatment	Measure	1	2	3
Control	1. NFCC[1]			
	2. DSA[2]	.34**		
	3. DHA[3]	.30*	.45**	
	4. RF[4]	.31*	.26*	.16
Secular	1. NFCC[1]			
	2. DSA[2]	.22		
	3. DHA[3]	.01	-.04	
	4. RF[4]	.04	-.33*	-.03
Benign religious	1. NFCC[1]			
	2. DSA[2]	.43**		
	3. DHA[3]	.11	-.08	
	4. RF[4]	.04	.12	.16
Punitive religious	1. NFCC[1]			
	2. DSA[2]	.34*		
	3. DHA[3]	-.12	-.14	
	4. RF[4]	.09	-.09	-.07

The direction of bivariate correlations in the control treatment is predicted and is 1-tailed; all other treatments are 2-tailed. ** Correlation is significant at the level 0.01 level (1-tailed). * Correlation is significant at the 0.05 level (1-tailed).
[1]NFCC = Need for cognitive closure, [2] DSA = Detection of supernatural agency.
[3] DHA = Detection of human agency, [4] RF = Religious fundamentalism

In line with the secular vs religious (benign and punitive) situational influences theme of the present thesis, the different correlations presented in Table 7 were tested for secular symbolism vs. benign religious symbolism, and secular symbolism vs. punitive religious symbolism differences. There were no significant differences between any of the comparisons, apart from the

correlation between religious fundamentalism and detection of supernatural agency in the secular symbolism vs. benign religious symbolism group. See Table 8.

Table 8

One Tailed Comparison of Correlations between Secular and religious (Benign and Punitive) Symbolism.

Comparison between Experimental Groups	**NFCC/ RF**	**NFCC/ DSA**	**NFCC/ DHA**	**RF/ DSA**	**RF/ DHA**	**DSA/ DHA**
Secular vs. Benign Religious Symbolism	$z = 0$ $p = .5$	$z = -1.15$ $p = .1251$	$z = -0.49$ $p = .3121$	$z = -2.25$ $p = .0122$	$z = -.93$ $p = .1762$	$z = .19$ $p = .424$
Secular vs. Punitive Religious Symbolism	$z = -.24$ $p = .4052$	$z = -.61$ $p = .2709$	$z = .61$ $p = .2709$	$z = -1.18$ $p = .119$	$z = .19$ $p = .4247$	$z = .47$ $p = .319$

1 NFCC = Need for cognitive closure, 2 DSA = Detection of supernatural agency, 3 DHA = Detection of human agency, 4 RF = Religious fundamentalism

Studies that report a correlation between NFCC and religious fundamentalismutilized measures that were taken free of experimental manipulation (e.g., Brandt & Reyna, 2010). Results presented above support this finding and further showed that the correlation between NFCC and religious fundamentalism is not observed under either secular or religious situational influences. Therefore, in Study Five B, which tested the main hypotheses of the study, all variable measures were taken before the priming procedure apart from the dependent variable (religious fundamentalism), which was taken after the priming procedure.

8.2.2 Study Five B

Study Five B tested the hypothesis that agency detection will explain the relationship between NFCC and religious fundamentalism when participants are uncertain. Specifically, it was hypothesized thatdetection of supernatural agency will positively mediate, and detection of human agency will negatively mediate

the relationship between NFCC and religious fundamentalism. The above mediated relationships were hypothesized to occur when participants are exposed to the secular symbols intended to prime uncertainty, and not religious primes which reinforce religiosity and provide closure.

Participants

There were a total of 161 Nigerian participants recruited around Akoka-Yaba, Lagos State. Due to frequent power outages 19 participants did not complete the experiment and were excluded from the analysis. Three participants failed the priming suspicion probe and were excluded from the analysis (see Bargh and Chartrand, 2000). Therefore, the actual number of participants used for the analysis was 139 (Male = 84, female = 54, missing data = 1) with a mean age of 21.73 years (SD = 3.43). Most participants were religious (Christian = 116, Muslim = 22, Non-religious = 2, missing data = 1). Participants were educated to different degrees (primary education = 1, O level = 9, undergraduate = 109, graduates = 17, postgraduates =2, missing data = 1)

Materials

Need for cognitive closure (NFCC). The brief Need for Closure Scale (Roets & Van Hiel, 2011) was used as a measure of NFCC, Cronbach's α = .84, *M* = 64.76, *SD* = 9.63.

Detection of supernatural agency. The 3-item index of supernatural control (Kay et al., 2010) was used as a measure of detection of supernatural agency, Cronbach's α = .57, *M* = 14.88, *SD* = 2.80.

Detection of human agency. The numerical judgement task designed by Valdesolo and Graham (2014) was used as a measure of detection of human agency, Cronbach's α = .61, *M* = 56.63, *SD* = 9.11.

Religious fundamentalism. The revised religious fundamentalism scale (Altemeyer & Hunsberger, 2004) was used as a measure of religious

fundamentalism, Cronbach's α = .73, *M* = 65.54, *SD* = 12.99.

Religious (punitive and benign) and secular situational influences. The same virtual dual n-back tasks used in Study Five A were used.

Procedure

The procedure was the same as Study Five A, apart from the sequence of presentation, which comprised of (1) the consent sheet, (2) NFCC measure, (3) detection of supernatural agency measure, (4) detection of human agency measure, (5) the familiarization dual n-back task, and (6) the priming dual n-back task. Afterwards, participants were asked to help complete questionnaires for another study that included the (7) religious fundamentalism measure.

8.2.2.1 *Results and discussion*

Nonparametric bootstrapping was used to test all the mediational models in the analysis (Hayes, 2009, Preacher, Rucker, & Hayes, 2007). There is significant mediation if the 95% bias corrected confidence bootstrap intervals do not contain zero (Preacher et al., 2007; Preacher & Hayes, 2004). All products were mean centered and heteroscedasticity-consistent SEs were used. All mediation models were based on a bootstrapping of 5000 samples (Hayes, 2013).

The relationship between NFCC and religious fundamentalismwas mediated by both detection of supernatural agency and detection of human agency when all the experimental treatments were combined. Higher levels of NFCC led to higher levels of detection of supernatural agency, which in turn led to increased religious fundamentalism. Higher levels of NFCC led to higher levels of detection of human agency, which in turn led to decreased religious fundamentalism. That is, the higher the need for cognitive closure, the higher the tendency to detect agency in the form of both detection of supernatural agency and detection of human agency.When the experimental treatments were analyzed separately this same pattern was only repeated in the secular condition, intended to prime uncertaintywith descriptive symbols such as

'…question everything' and 'stop and think rationally'. In the religious priming treatments (benign and punitive), detection of agency (human and supernatural) did not mediate the relationship between NFCC and religious fundamentalism, apart from one exception. In the punitive religious treatment, detection of supernatural agency mediated the link between NFCC and religious fundamentalism. See Table 9 for the total and specific indirect effects of the combined and individual treatments, as well as the BootLLCI and BootULCI of the combined and secular treatment for significant mediation (i.e., Boot LLCI and Boot LLCI that do not contain zero).

Table 9

Total and Specific Indirect Effects of NFCC→DSA→ RF and NFCC→DHA→RF

Situational Influence		Standardised Beta Weight	Boot SE	BootLLCI	BootULCI
Combined	Total	-.03	.06	-.1578	.0910
	DSA[1]	.07	.04	.0151	.1600
	DHA[2]	-.10	.05	-.2230	-.0249
Secular	Total	-.12	.12	-.3538	.1027
	DSA[1]	.11	.07	.0033	.2880
	DHA[2]	-.23	.12	-.5165	-.0445
Benign religious	Total	-.12	.12	-.4166	.0494
	DSA[1]	-.04	.06	-.1981	.0354
	DHA[2]	-.08	.09	-.3324	.0206
Punitive Religious	Total	.08	.11	-.1826	.2905
	DSA[1]	.13	.08	.0142	.3362
	DHA[2]	-.05	.07	-.3129	.0294

Confidence intervals are 95% bias corrected, based on 5000 bootstrap samples. [1] DSA = Detection of supernatural agency, [2] DHA = Detection of human agency, NFCC = Need for cognitive closure, RF = Religious fundamentalism.

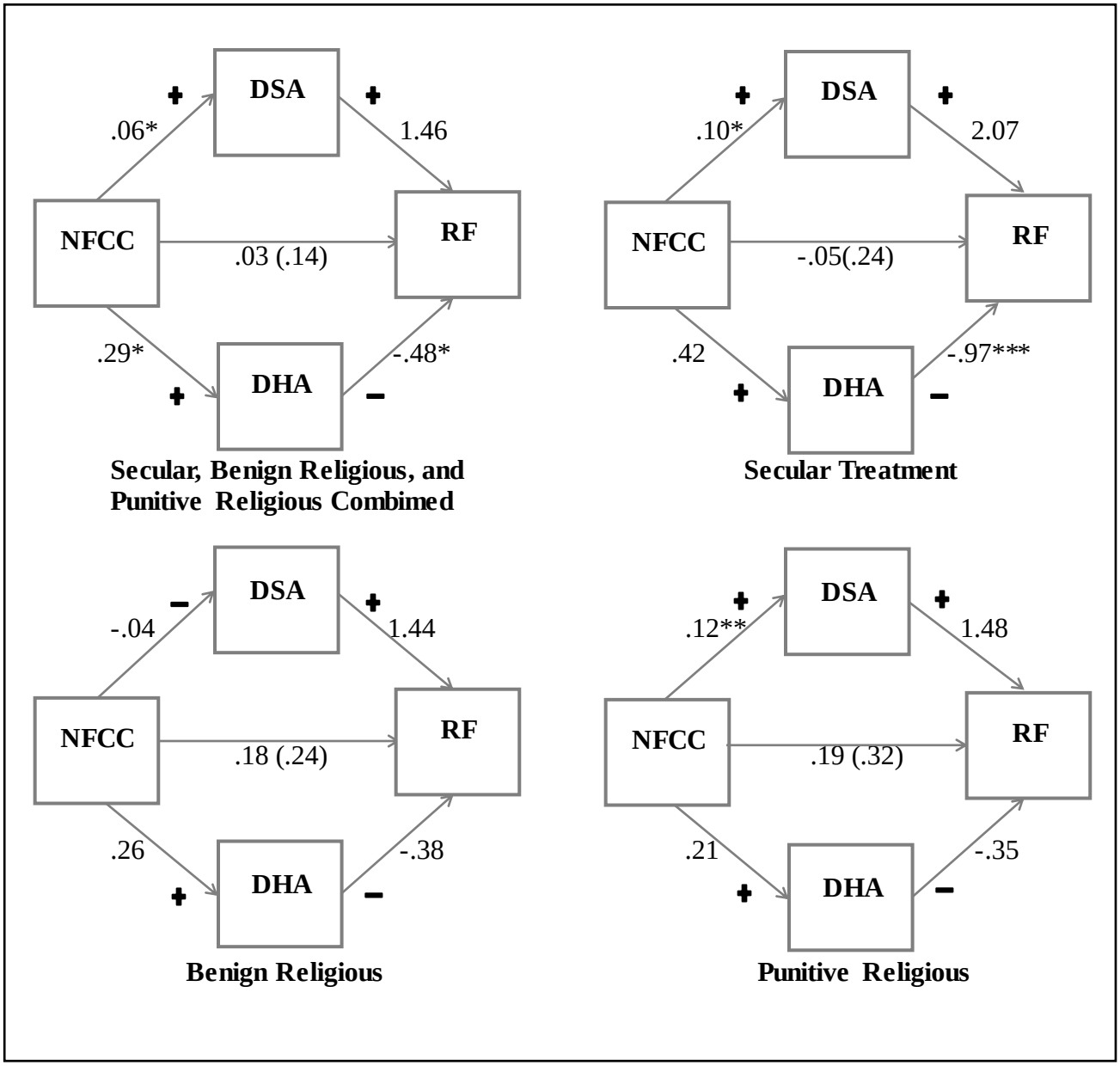


Figure 25.Unstandardised regression coefficients and SEs (in parentheses) of NFCC→ DSA→RF and NFCC→DHA→RF mediation paths when all experimental treatments are combined and when they are analysed individually.

*P< 0.05, **P< 0.01, ***P< 0.001, ✚ positive relationship, ▬ negative relationship
NFCC = Need for cognitive closure, DSA = Detection of supernatural agency
DHA = Detection of human agency, RF = Religious fundamentalism

A direct causal effect was not postulated between NFCC and religious fundamentalism. Although studies have shown a positive correlation between NFCC and religious fundamentalism (Brandt & Reyna, 2010), this does not imply causation. The modern approach to mediation analysis does not require a

significant X→Y direct effect to investigate the X→M→Y indirect effect (Hayes, 2009; 2012). In the situational variations of the model tested, the mediators 'detection of supernatural agency' and 'detection of human agency' operated in different directions (apart from the benign religious treatment), when this is observed, the effects cancel each other out to produce non-significant direct and total effects, this however has no bearing on the specific indirect effects (Hayes, 2012).

In line with the secular vs religious (benign and punitive) situational influences theme of the present thesis, the standardised beta weights of secular symbolism vs. benign religious symbolism, and secular vs. punitive religious symbolism were assessed. There were no significant differences between any of the comparisons. See Table 10 below

Table 10

Comparison of Standardized Beta Weights between Secular and Religious (Benign and Punitive) Symbolism.

Comparison between	**Mediators**	
Experimental Treatments	Detection of Supernatural Agency	Detection of Human Agency
Secular vs. Benign Religious Symbolism	$t(91) = 1.63$, $p = .1072$	$t(91) = 1$, $p = .3200$
Secular vs. Punitive Religious Symbolism	$t(81) = 0.19$, $p = .8512$	$t(81) = 1.30$, $p = .198$

The single positive effect of NFCC on agency detection supports Barrett's (2004) conception of HADD as a specific cognitive device. The present research however also demonstrated that HADD is a multi-functioning device, and perhaps more insight can be gained in utilizing Atran and Norenzayan's (2004) view of HADD as a cognitive system. The studies were carried out in the highly religious country of Nigeria and it will be interesting to investigate if the findings reported here will be repeated in less religious cultures.

CHAPTER 9

9. Concluding Chapter

This chapter will review and summarize the theoretical frameworks that contributed to the research questions assessed in the present thesis, as well as summarize the main findings from the experiments carried out. Theoretical and experimental limitations will be considered, and lastly, brief recommendations for future research and policy will be offered.

One primary interest of the present thesis was to assess signs (religious and secular) from a psychological perspective to offer new insights to an already rich theoretical framework of semiotics. Beyond Peirce's (1955, 1978) triadic model (i.e., representamen, object, and interpretant) and Saussure's (1916, 1986) dyadic model (i.e., signifier and signified), which are still relevant in semiotics, Cousins' (2012) telic triadic model (i.e., signifier, intendant, and signified) offered an ideal framework to situate the research paradigm of the present thesis. The particular facet of interest in Cousins' model was the intendant, primarily for two reasons. Firstly, the signifier and signified facets have been thoroughly explored, particularly through the Saussarian framework and its offshoots. Secondly, the intendant facet is theorised to be a subjective representation of internalised goals and motivations stored in the memory of the individual, and as such it offers an ideal avenue for psychological exploration.

Within the general psychological theoretical frameworks considered, the dual theory of cognition was of interest, particularly because the priming effect of signs are theorised to occur primarily through Type I cognitive processing (Bargh, 2006; Custers & Aarts, 2005;Evans & Stanovich, 2013a; Gollwitzer, 2011; Strahan, Spencer, & Zanna, 2002). The dual process theory of cognition was also utilized because the two variables of interest (religiosity and scepticism) are theorised to occur through Type I and Type IIcognitive processes, respectively. To engage critically with dual theories of cognition, several frameworks were considered and two consequential conclusions will now be put forward, based on consideration of previous literature and the new

results presented above.

Firstly, cognitive processing is not limited to two systems but better viewed as a collection of systems, subsystems, and specific mechanisms which function through Type I and/or Type II cognitive processing (Baumard & Boyer, 2013; Eraña 2011; Evans & Stanovich, 2013). Secondly, the default-interventionist dual-process framework (Evans & Stanovich, 2013; Kahneman & Frederick, 2002, 2005; Stanovich, 2004; Stanovich & West, 2008) presently offers more clarity than other dual process frameworks in understanding the relationship between religiosity/scepticism and Type I/Type II cognitive processing.

The conclusions put forward in the present thesis, and by Stanovich and colleagues, about the dual process theory of cognition (i.e., that there are many systems, subsystems, and mechanisms which function through two different interacting processes), offered the opportunity to critically engage with the weak massive modular view advanced by Carruthers (2006, 2008), and consequently examine specific ubiquitous cognitive processes and mechanisms proposed by CSR researchers. The first study carried out was a preliminary study to gather primary data about the level of religiosity in Nigeria through quantifying the rate of God references in two non-religious Nigerian national newspapers. The studies of primary interest were Studies Two to Five, which will be explored in depth below. Studies Two and Three showed a general priming effect of religious vs. secular signs, and this effect will be discussed in terms of the conditions which gave rise to the results found (i.e., the tedium effect in doctrinal religiosity, the intendant in semiotics, and automaticity in dual process theories). Study Four assessed the effect of a religious sign (crucifix) on a more specific cognitive process (i.e., immortality bias). Study Five A replicated the correlation found in previous studies between NFCC and religious fundamentalism, and showed a positive correlation between detection of supernatural agency and detection of human agency. Finally, Study Five B assessed the effect of religious and secular signs on an even more specific mediated relationship between NFCC and religious fundamentalism through detection of supernatural agency (positive mediation) and detection of human agency (negative mediation).

9.1 The Intendant, the Tedium Effect, and Automaticity

Cousins (2006) describes the intendant as a subjective disposition toward an end goal attained consciously but that becomes latent and preconscious. This preconscious goal informs the link between the signifier and the signified, without the individual having to make a conscious inference. For instance, a Christian need not consciously link a signifier such as a crucifix with the signified (e.g., Christianity), and with a particular goal (e.g., forgiveness of sins or going to Heaven). The inference or thought processes that connect the signifier (i.e., the crucifix) to the signified (Christianity) and the particular goal (forgiveness) would have already been established consciously, through previous interactions. The intendant, however, due to its subjective nature, changes according to the particular individual and the particular context in which it is used (see Figure 3 for an illustration).

Several studies show that signs can be utilized to elicit implicit goals stored in memory (Aarts & Dijksterhuis, 2000; Bargh, 1990; Bargh & Ferguson, 2000; Glaser & Banaji, 1999; Moskowitz, 2002; Shah, Kruglanski, & Friedman, 2002), even when the goal has been modified by recent experience, given that the old implicit goal/associative knowledge had been repeated enough times to be embedded in memory (Devine, 1989). High levels of frequency of repetition is a core characteristic of doctrinal religiosity, as opposed to imagistic religiosity (Whitehouse, 1995, 2000, 2001a, 2001b, 2002a, 2002b, 2004, 2005). The religious signs of interest in the present thesis are from Christianity, which is a doctrinal religion. High levels of repetition leads to what Whitehouse has termed the 'tedium effect', where over-familiarity with particular units of information leads to a deficiency in active conscious processing of those units, as a consequence of the high level of repetition. Within the automaticity research paradigm, Stanovich (2004) terms the tedium effect of Type II-cum-Type I processes as the set of autonomous subsystems (TASS), while Smith and DeCoster (1999, 2000) term them 'functionally parallel neural networks'.

The associations between the religious signifiers, the intendant, and the

signified for the participants in Studies Two and Three were acquired socially. Although Nigeria is constitutionally a secular country, the society is highly religious, and the religious signs utilized are highly conspicuous within the country (Chiluwa 2012;Gallup, 2010; Mandryk & Johnstone, 2001; WIN-Gallup, 2012). Study One revealed the high presence of religion in putatively non-religious Nigerian national newspapers (i.e., there were multiple references to God every day in both the tabloid and broadsheet newspapers assessed); see also Appendix F for sample pictures of religious signs in Nigeria.

Religion has been linked with Type I cognitive processing, which is associative, non-conscious, fast, and autonomous, while scepticism toward religion has been linked with Type II cognitive processing which is abstract, conscious, slow, and controlled (e.g., Aarnio & Lindeman, 2007; Buzdar, Ali, & Tariq, 2015; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Shenhav, Rand, & Greene, 2012). The present thesis however challenged this framework, opting rather for the default-interventionist account (Evans & Stanovich, 2013;Stanovich, 2004; Stanovich & West, 2008). Within the default-interventionist framework, Type II processes intervene on default Type I processes, depending on the individual processing the information and the context in which the information is processed. Studies Two and Three showed that in the highly religious country of Nigeria, when the situational context was manipulated by exposing participants to secular signs, participants scored lower on an irrationality measure (i.e., RRII) in comparison with participants exposed to religious signs, particularly signs signifying a punitive God. These results were observed regardless of the educational level and religiosity of the participants. The results in Studies Two and Three were discussed in terms of the primed content generated by Type I cognitive processing which Type II cognitive processing acted on.

Mercier and Sperber's (2011a, 2011b) argumentative theory of reasoning also helps to illuminate the conclusions in the above paragraph. According to Mercier and Sperber, controlled and conscious reasoning, which is a Type II cognitive process, evolved to support the conclusions generated by evolutionarily older cognitive mechanisms (i.e., Type I cognitive processes). Therefore, if

participants do not consciously use their Type II cognitive processes to override the inferences generated by Type I processes, then the use of these Type II processes will be restricted to justifying the inferences and conclusions generated by Type I processes.

9.2 Religious and Secular Signs and Their Interactions with Specific Cognitive Processes

Beyond the general dual process theory of cognition, the present thesis engaged with more specific cognitive mechanisms and processes theorised to support the acquisition of religion. Firstly, the strong informationally encapsulated view of modularity by Fodor (1983) was considered to be too restrictive, therefore less restrictive views of modularity were engaged with, such as Carruthers's frugal view (2006, 2008) and Barrett and Kurzban's (2006) functional specialization view. Fodor's (2000) later work was also cited to be critical of the all-or-nothing informationally encapsulated view of modularity, particularly in explaining high level cognition.

Bering and colleagues (e.g., Bering, 2002, 2006; Bering & Bjorklund, 2004; Bering, Hernandez, Blasi, & Bjorklund, 2005) advance that the bias to think that the enduring qualities of personhood continue after death reveals an intuitive pattern of reasoning that predisposes us to religiosity. Within this theoretical framework, the continuity of mental states (epistemic, emotional, and desire) are favoured over physical states (biological, psychobiological, and perceptual). Bering argues that since it is epistemologically impossible to know what it is like to be dead, the knowledge base from which one imagines a divergent stance and a discrepant reality is itself imagined. Further, from this imagined knowledge base, it is easier to conceptualise the absence of physical states than the absence of mental states.

Responses to questions about the continuity of personhood after death are often confounded by cultural and religious knowledge. To address this problem, relevant studies are usually carried out with children, who in comparison with adults have far less exposure to acquired knowledge about life after death.

Younger children also have developing abstract reasoning skills and rely more on intuitive inferences. Within these studies, younger children generally report more continuity of personhood after death than older children. This observation is interpreted as an indication that younger children, by virtue of their developing reasoning skills, use intuitive patterns of reasoning to conclude that personhood continues after death.

Emmons and Kelemen (2014) devised a novel methodological method to further reduce the impact of acquired cultural/religious knowledge on questions about the continuity of personhood. They asked children questions about themselves before they were born, to ascertain if children conceived of their personhood as having existed before birth. This approach was used because of the relative lack of cultural/religious scripts which address life before birth (i.e., retrograde immortality), in comparison with life after death (i.e., future immortality). Study Four in the present thesis utilized Emmons and Kelemen's approach but further investigated the effect of a future immortality sign (the crucifix) on children's reports of retrograde immortality. Children were hypothesised to make the connection between future immortality and retrograde immortality through their ability and tendency to reason by analogy (Chen, Sanchez, & Campbell, 1997; Goswami, 2001; Hofstadter, 2001; Richland, Morrison, & Holyoak, 2006; Thibaut, French, & Vezneva, 2010).

In Study Four, conceptualization of retrograde immortality was compared between children who were exposed to a religious/future immortality sign and children who were exposed to a secular/non-religious sign. The results showed that children who were exposed to the religious sign reported stronger beliefs in retrograde immortality than children who were exposed to the non-religious sign, regardless of age. The connection children made between the future immortality sign and the conception of retrograde immortality sheds more light on the nature of the intendant, which has not been previously explored. According to Cousins (2006), the links between the signifier, the intendant, and the signified, would have to have been already established in the mind of the perceiver. However, the children in Study Four exposed to the religious sign were able to make a novel link (i.e., crucifix - life before birth - continuity of life),

based on a previously established link (i.e., crucifix- life after death-continuity of life). Carruthers' (2006) argument about the role of a central integrating module which integrates inferences from different specific cognitive mechanisms and processes might also explain the above observed phenomenon. According to Carruthers, this integration extends beyond similar semantic content; for instance, metaphors can forge an integration through language between weakly associated concepts, that otherwise would have never been integrated, and when thus integrated can generate additional inferences, which are then strengthened through rehearsal.

The fifth and final study investigated how agency detection explains (mediates) the relationship between NFCC and religious fundamentalism. To briefly recap, it is theorised that the ubiquitous tendency of humans to infer agency in chains of events (even when none might exist) predisposes us to religiosity (Barrett, 2002, 2004; Guthrie 1993). Barrett argues that the sensitivity of HADD increases when individuals are uncertain or are in ambiguous situations. NFCC is a motivated response to find any plausible answer in uncertain and ambiguous situations (Amit & Sagiv, 2013; Kruglanski, 1989, 1990; Kruglanski & Webster, 1996). Religion qualifies inferences generated by HADD, by providing specific names of perceived agents, and minimally counterintuitive narratives which are memorable and which inform our conceptualisation of the supernatural agent's theory of mind. Religious fundamentalism over-attributes the detection of supernatural agency and under-attributes the detection of human agency. Therefore the mediated relationship between NFCC and religious fundamentalism by detection of supernatural agency (positively) and detection of human agency (negatively) was tested in the context of exposure to religious signs that prime religious certainty and secular signs that prime uncertainty.

The results of Study Five showed that secular signs which instructed participants to "stop and think rationally" and "think for yourself and question everything" provided the appropriate situational context for both detection of supernatural agency to positively mediate and detection of human agency to negatively mediate the relationship between NFCC and religious

fundamentalism. This mediated relationship was not observed when participants were exposed to signifiers indicating a benign God, and only detection of supernatural agency positively mediated the relationship between NFCC and religious fundamentalism when the signifiers indicated a punitive God. The implications of using secular signs in public places will be discussed below.

9.3 How Might Conformity Explain the Results of the Series of Experiments Carried Out?

Classic conformity distinguishes between normative and informational conformity (Deutsch & Gerald, 1955). Normative conformity occurs when individuals alter their behaviour to obtain and/or maintain group desirability (Lonnqvist et al., 2009; Navarrete, Hall, & Fessler, 2005), and to avoid social disproval (Cialdini & Goldstein, 2004). Informational conformity occurs when individuals alter their behaviour due to a desire for accuracy; it is more internalised than normative conformity and its effect is more pronounced when the individual lacks competent information (Lonnqvist et al., 2009).

The results of Study One revealed a high rate of God references in two non-religious Nigerian national newspapers, particularly in the tabloid newspaper, and that God references appeared every day in both newspapers. No individual is born with knowledge of particular religious narratives or answers to existential questions, such as life after death. Nigeria is a highly religious country, such that religious explanations for natural occurrences are predominant, as in the rest of Africa (Luyaluka, 2016). If individuals that read these papers come across God references every day from different journalists quoting different interviewees, given that the theory of conformity holds, this would influence them to (1) maintain their religiosity in light of the religiosity of others, and (2) embed the God references / religious references of others to become even more religious (although see Section 9.4 below)

In both Studies Two and Three, the primes used were supraliminal, that is, although participants could see the symbols, they were not meant to know that

the symbols were part of the experiment, or that the symbols were meant to have any influence on them. As discussed in Section 3.3, according toCEST (Epstein et al., 1996) and the argumentative theory (Mercier & Sperber, 2011), at least in ambiguous situations, when individuals conform, they would have already done so automatically and non-consciously, and only moments later try to justify why they had altered their behaviour (i.e., for normative or informational reasons). One explanation, other than the default-interventionist dual process theory, for the results observed in both Studies Two and Three is that having seen the symbols, participants might have non-consciously conformed to the perceived ideology of the experimenter (i.e., secularism in the secular treatment with secular symbols and religiosity in the religious treatments with the benign and punitive religious symbols). Further, when probed, participants would have searched for reasons (consciously) to justify their responses, which might not have been the real reasons for their responses (given that the process that led to their responses occurred autonomously and non-consciously).

In light of the above, Studies Four, Five A, and Five B offer better methodological strengths that avoid the confounding effects of conformity. In Study Four, participants were asked questions about how they conceive of life before birth (i.e., retrograde immortality). In this experimental procedure, there was no apparent position that the participants could think would be preferred by the experimenter. The primes presented were not necessarily pro-retrograde immortality or anti-immortality. Instead, the religious prime alluded to future immortality (crucifix) and the secular prime was an image of a hospital. Therefore, it can be argued that conformity played no significant role in the results obtained in Study Four.

Study Five A was a correlational study, with the primary interest being to confirm that NFCC and religious fundamentalism will be positively correlated, as reported in other correlational studies free of experimental manipulation (e.g., Brandt & Reyna, 2010). A further aim was to investigate if (religious vs. secular) experimental primes would affect this relationship, which they did. The above results informed Study Five B, which took measures of NFCC, supernatural

agency detection, and natural agency detection before presentation of the religious versus secular primes. When participants were filling in the NFCC and agency detection measures, there was no indication (i.e., no symbols) to suggest which kind of answers would be favourable to the experimenter, and hence to influence participants to conform to this 'favourable' set of answers. Therefore, it can also be argued that conformity played no significant role in the results which showed that the relationship between NFCC and religious fundamentalism is positively mediated by detection of supernatural agency and negatively mediated by detection of human agency.

9.4 Studies One, Two, and Three in Relation toWilliam James's Social Selfand Erving's Dramaturgical Analysis

According to James (1890), individuals possess multiple personality dimensionswhich are expressed according to situational context (e.g., in a religious gathering vs. a secular social gathering). Study One showed the high prevalence of religious references in two non-religious Nigerian national newspapers. Newspapers disseminate information; they provide a lens through which reality is comprehended (Fiske, 1992). Even if the high presence of God references in the newspapers does not influence individuals to conform (through informational conformity, which becomes embedded in one's worldview), individuals who read these God references become more acquainted with the opinions of religious others. Proficient knowledge of the religiosity of others (which is high among the majority in Nigeria) has implications for both James's social self and Erving's (1959) dramaturgical analysis.

If one is religious, and by implication has a religious social self which he/she displays in the appropriatecontext, knowledge of the religious references in the newspapers (Study One) and various other mediums in Nigeria should give the individual more confidence that his religious social self is accepted and dominant within society. By the same token, this knowledge base also gives the individual (the actor) a source of reference when acting out to please religious others (an audience), given that the actor's primary goal in his presentation is

an accepting audience (Erving, 1959).

Similarly in Studies Two and Three, participants could have easily acted out to be more sceptical in the secular experimental treatments and more religious in the religious experimental treatments. Further, if participants in these studies possessed an analytical social self as well as a religious social self, they should have had no problem switching between these different social selves according to context (i.e., religious or secular). These generalisations however cannot be made for Studies Four, Five A, and Five B, for the same reasons explained in the section above on conformity (i.e., individuals would have been unaware of the particular intent of the experimenter, who was the sole audience).

9.5 Studies Four, Five A, and Five B in Relation toWilliam James's Spiritual Self

As described in Section 1.4.2, James's (1890) spiritual self is the most abstractly defined of all his classes of selves. James refers to the spiritual self as "… a man's inner or subjective being, his psychic faculties or dispositions…" (pp. 296), and the "central nucleus of the Self" (pp. 298). These so-called "mysterious operations" of the self, mysterious because the onset of the operations are not open to conscious introspection, and rathercan only be known once the operation has begun, were above reconciled with Type I cognitive processes and with specific cognitive mechanisms within CSR.

Within CSR, it is theorised that the acquisition and maintenance of religion is aided by the by-products of mental adaptations that evolved to fulfil non-religious functions (Barrett, 2000; Boyer, 1994, 1996, 2000; Guthrie, 1980, 1993; McCauley, 2000; Sperber, 1996). These mental adaptations are conceived of as specific cognitive mechanisms (e.g., HADD [Barret, 2004]; immortality bias [Bering, 2005]). Study Four investigated immortality bias, that is, the general bias towards thinking that at least some qualities of personhood continue after death (Bering, 2002; Bering & Bjorklund, 2004, Bering, Hernandez Blasi, & Bjorklund, 2005). Through introspection, why might one think this? It's impossible to know that some form of one's life will continue after

death, yet some individuals strongly believe in it, and past research (e.g., Bering & Bjorklund, 2004; Emmons & Kelemen, 2014), as well as Study Four of the present thesis has shown that this bias exists even in children. Could this feeling of knowing, without evidence or instruction, that life continues after death (and possibly had been in existence before birth) be one of the mysterious intuitive dispositions referred to by James (1890)?

Study Five A replicated the correlation between NFCC and religious fundamentalism reported by previous studies (e.g., Brandt & Reyna, 2010). This finding throws light on the general thesis of CSR that specific cognitive mechanisms (in this case NFCC) support and maintain religiosity (e.g., Sperber, 1996). Study Five B showed that two of these specific cognitive mechanisms (NFCC and HADD) contribute toward religious fundamentalism; specifically, that agency detection mediates the relationship between NFCC and religious fundamentalism. But what is NFCC and what is agency detection? They are Type I processes not open to conscious introspection, and we do not willingly engage in NFCC or agency detection; they are autonomous, fast, and go on to influence conscious Type II cognitive processing. Like immortality bias, both NFCC and agency detection fit James's (1890) description of mysterious dispositions of the spiritual self. Mysterious not because of metaphysical properties, but because of the way these dispositions arise and are strongly felt. These Type I cognitive processes (and their relationship with Type II cognitive processes) particularly fit James's (1890) description that we only get a sense of where the sensory input facilitated by our psychic disposition ends and motor input begins.

9.6 Limitations

Content analysis, carried out in the preliminary Study One, is a descriptive method and provides little insight into the underlying motives behind the themes identified. Study One was carried out as an unobtrusive introduction to the religious climate of Nigeria, where all later studies were also carried out. Religious signs are ubiquitous in Nigeria, including churches/mosques and the signposts that lead to them or advertise them; there are signs warning of Hell

and others offering deliverance (see Appendix F). In the most rural of places, churches are the only colourful buildings and usually the only ones that stand out. In urban environments there are churches, mosques, and religious signs on almost every road and on many streets and closes. For instance, in one of the houses in which I stayed during my field trip, there were two churches in the same close, as well as a couple of others around (e.g., behind the house) which I couldn't see but often heard when they were conducting religious activities. In more exclusive vicinities religious signs are still present but are sparser. It was therefore a challenge to try to quantify the number of religious signs, as no one single area represented the entire country. To overcome this, a content analysis of two national newspapers was utilized, because although there are state-to-state differences in Nigeria, the two newspapers that were analysed can be found in every state.

Content-analysis of media however can be unreliable because newspapers report topical issues, and the identification of a particular theme (e.g., debate on depicting the image of Mohammed after the Charlie Hebdo shooting in France) may not necessarily be the enduring concern or theme of that newspaper.

The most outstanding limitation in the experiments carried out (apart from the preliminary Study One) was also a necessary methodological design feature. Using signs to prime participants to make predictable responses is most useful when the presentation of the sign is subliminal, particularly when automaticity or non-conscious cognitive processing is expected. For instance with masked priming (Forster & Davies, 1984), the relevant sign is presented to participants on a screen for very few milliseconds and followed afterwards by a non-significant sign. The prime is presented for few milliseconds so the participant does not perceive the sign consciously but non-consciously. This is a much better methodology from which conclusions can be drawn about the non-conscious/automatic effects of signs. However, the main concern of the present thesis was to explore the effects of conspicuous religious signs in Nigeria on Nigerians. It was of particular interest to have the signs visible, as they would be in a real life setting of a highly religious country.

In the studies carried out, the attention and conscious cognitive processing of participants were occupied by engaging them in a distraction task on which they had to concentrate. This was done to prevent the participants from consciously thinking about the signs. Although none of the participants in Studies Two and Three reported being influenced by the signs, and only a hand-full reported being influenced by the signs in Study Four (who were excluded from the analysis), it cannot be concluded with certainty that the signs did not make the participants consciously (through Type II processing) select their responses.

To address this social desirability factor, one of the studies (Study Three) was carried out on a busy street where there were other signs (commercial, government, and religious signs). It was intended that the presence of the other signs would make the experimenter's signs less conspicuous. Studies Four and Five circumnavigated this problem by testing very specific mediated cognitive processes which participants could not be aware of. Further, in Study Five B some of the variables (i.e., NFCC, detection of supernatural agency, and detection of human agency) were measured before participants were exposed to the signs.

The fieldwork in the present thesis was only carried out in two states; the former capital Lagos, and the present capital Abuja. Nigeria has a total of 36 states and these two states are not representative of the entire country, therefore caution should be applied when generalising the results of the experiments carried out. Nonetheless, like most capital states in countries with diverse ethnic groups, a greater mix of Nigerians can be found in Lagos and Abuja than in any other individual state in Nigeria.

CSR gains its explanatory power particularly from evolutionary psychology and cognitive psychology to explain how religion is acquired. Evolutionary psychology has received criticism for mistaking metaphors for mechanisms (e.g., Gantt, Melling, & Reber, 2012; Gantt & Thayne, 2012). Gantt and colleagues' main point of contention is that the term 'mechanism' has been unduly appropriated from the physical sciences such as engineering, where mechanisms are physical (e.g., a bolt) to psychology where what are termed as

mechanisms are not physical, and therefore should be termed as metaphors. Perhaps, when Gantt and colleagues write that these mechanisms are not physical, they refer to the emergent qualities of the mind and observed behaviour. Contemplating the emergent qualities of the mind has a long standing tradition particularly in philosophy (e.g., Lewes, 1875; Dennett, 1984; Wilson, 2015), however Gantt and colleagues did not engage with this literature and never used the word 'emergent' in their criticism against evolutionary psychology in the two articles referenced. Evidence in support of evolutionary psychology comes from a wide variety of related fields (e.g., primatology, ethology, anthropology, biology and archaeology). Nonetheless, the specific mechanisms utilized in the present thesis have not yet been physically identified and labelled, therefore, there is reason to apply caution when considering the cognitive mechanisms theorised to be responsible for religion. Engaging critically with criticisms against evolutionary psychology, and by extension, CSR, can only help to further our understanding.

9.7 Recommendations

Two sets of recommendations will be offered; the first address future research in psychology and the second address policy. The policy recommendations are offered on three interconnected levels: macro, institutional, and individual.

9.7.1 Recommendations for Future Research in Psychology

In line with Evans and Stanovich (2013), it is recommended that dual theories of cognition should stop using the terms System 1 and System 2, because cognition is made up of many systems, sub-systems, and mechanisms. Novel to the present thesis is the insistence that in the rationality vs. religion debate, often explained through Type I and Type II processes within socio-cognitive psychology, it is fundamental to separate content from process. Individuals can use their Type II cognitive processing to arrive at very irrational religious conclusions, and the conclusion generated by Type I cognitive processing need not be irrational every time. For instance, through coincidence Type I processing could produce a rational secular conclusion, because the content

could be rational even if the process through which it was achieved was not. Therefore, it is important that future studies interested in dual-process theories generally, and in the rationality vs. religion debate through dual-process theories specifically, recognise and apply the difference between content and process.

Rationality is multifaceted, and overlooking this fact has led to circular arguments within the rationality vs. religion debate, where each side of the debate offers valid points for or against the rationality of religion, albeit with each side referring to a different facet of rationality. For instance, on one hand, arguments against the rationality of religion focus on inferential rationality, pointing out how particular religious beliefs are not universally valid and are undermined by specific logical rules. On the other hand, arguments for the rationality of religion focus on other forms of rationality, such as epistemological rationality, which concerns the individual's subjective source and history of knowledge of his/her religious belief and epistemic goal. For any rationality vs. religion debate to be productive, the particular facet/s of rationality will have to be pre-defined, and all points for or against the rationality of religion will have to be on the particular predefined facet/s.

Studying the way we conceptualize ourselves without our physical body has benefitted greatly from asking participants how they conceive of their biological and mental functions after death. This methodology has benefitted from assessing the intuitive concepts of young children rather than adults whose responses might be confounded by their religious beliefs and/or religious exposure. Recently, this methodology has been improved upon by asking young children about how they conceive of themselves before birth rather than after death. Questioning children about life before birth rather than life after death is considered an improvement on the previous methodology because children old enough to comprehend questions about life after death are also cognitively mature enough to comprehend and to be exposed to the religious belief of their parents/guardians, particularly in highly religious countries. In most of these religions however, there are no explicit narratives about life before birth (notable exceptions are the religions of the East with a doctrine of reincarnation). Another aim of questioning children rather than adults is to elicit an intuitive

response, preferably one they had never thought of before. Children are exposed to death through various means, for instance, the death of pets, family members, and fictional characters, and may therefore be afforded more opportunity to consider what happens after death in comparison with before birth. The present thesis enhanced this line of research by showing that even if children are unfamiliar with questions about life before birth, they can be predictably influenced to make the same judgements about life before birth as they would about life after death, by (1) the influence of life after death primes and (2) their ability to reason by analogy. Studies interested in this line of research should understand the history of the methodological improvements outlined above and seek to improve on them further.

Agency detection supports the acquisition of religion (Barrett, 2004; Guthrie, 1993). However, detected agency can be natural (e.g., a human) or supernatural (e.g., a god). The results of the present thesis indicate that a high tendency to attribute agency to a natural cause (human in this case) has an opposite effect on religious fundamentalism in comparison with a high tendency to attribute agency to a supernatural cause. More research needs to be carried out to further substantiate this finding across various contexts. For instance, although the research in the present thesis was carried out in the highly religious country of Nigeria, similar research could be carried out in a highly secular country such as Sweden.

The role of specific cognitive mechanisms and processes in the acquisition of religion is the bedrock of CSR. The role of NFCC has not been given much attention and needs to be given as much thought as has gone into agency detection and theory of mind. NFCC has been shown in previous studies, as well as in the present thesis, to be positively correlated with religious fundamentalism. The results of the present thesis also indicate that NFCC is positively correlated with agency detection (detection of both human and supernatural agency). More studies ought to be carried out to investigate the relationship between NFCC and other specific cognitive mechanisms and processes hypothesized to be responsible for the acquisition of religion.

9.7.2 Policy Recommendations

The present section will offer policy recommendations relevant to Nigeria at three interconnected levels (macro, institutional, and individual). The macro level addresses the state and federal governments, the institutional level addresses educational and media institutions, and the individual level addresses individuals in Nigerian society.

Before the various policy recommendations are discussed it is important to make a disclaimer. Modern secularism holds dearly all the tenets of human rights, including freedom of religious practice and freedom of speech. All the recommendations outlined below are not intended to impinge upon the rights of individuals to practice any religion of their choice. The present thesis is not concerned with disproving any particular religion, but rather with promoting healthy scepticism, which could be useful to any school of thought, but especially to those devoted to use of the scientific method.

9.7.2.1*Macro Level*

The macro level policy recommendations are targeted towards the state and federal government of Nigeria, which have a significant level of influence over all individuals and institutions.

9.7.2.1.1 *Recommendations for government policy*

The provision of welfare systems in low Socioeconomic Status (SES) communities

Socioeconomic status (SES) has been shown, across a number of surveys and studies, to be inversely related to religiosity, i.e., religiosity increases as SES drops, and vice versa (Barber, 2011; 2012; Heaton, 2013; Norris & Inglehart, 2004; WIN-Gallup, 2012). Low SES individuals, with no other means to address existential problems, are more likely (than individuals with means) to rely on

religion to solve their problems. Further, the more desperate low SES individuals are, the greater the reliance on religion will be, including the use of functional rationality to achieve their desired end. Recall that functional rationality is principally interested in the end result (e.g., wealth), and not the means through which it is achieved (e.g., as often happens in some rural Nigerian low SES communities, the torturing of a child who is accused of witchcraft and therefore of hindering the economic progress of the family). The provision of welfare systems in the most affected parts of Nigeria will contribute towards the reduction of reliance on religion in addressing existential problems brought about by low SES.

Cautionary Note: High SES and the financial ability to address existential problems such as poverty are not failproof solutions for reducing religiosity and religious fundamentalism. For instance, a considerable number of religion-influenced terrorists are not low SES individuals (Atran, 2003). Similarly, Umar Farouk Abdulmutallab, the only Nigerian in recent times to receive notoriety for planning a religion-related terrorist attack on the US, is from a high SES family (Yusha'u, 2014).

Pros: Provision of welfare systems that address existential concerns (e.g., provision of free medical care and shelter) offers benefits that would seem to far exceed the costs of reducing the level of religiosity in any society.

Contemporary Example: Sweden is a high welfare system, high SES country, and one of the least religious countries in the world. To be clear, it is not necessarily being implied here that the high SES and the welfare system of Sweden led to the low religiosity of its citizens. It is implied, however, that the high SES and high welfare system of Sweden addresses the conditions that would have led low SES individuals to seek religious means to address their existential concerns, such as free medical care instead of prayers, and accessible bank loans for business initiatives instead of blaming witches or evil spirits for financial instability.

Encourage and promote nudge initiatives

The 'nudge' concept (Rainford & Tinkler, 2011; Thaler & Sunstein, 2008) draws on advances in cognitive and social psychology as well as behavioural economics. The nudge concept is predicated on the view that humans are default cognitive misers, that is, they are prone to using cognitive shortcuts (e.g., biases and stereotypical thinking enabled by Type I cognitive processes). Therefore, nudge programmes encourage the practical application of this knowledge by promoting the intelligent design of public spaces in order to positively influence individuals to make predictable choices beneficial to themselves and to society.

The series of studies in the present thesis (apart from Study One) all show that religious vs. secular situational influences have significant impacts on the way individuals rate their levels of religiosity and religious fundamentalism. It is recommended that state and federal governments become aware of the impact of excessive religious symbolism within Nigeria and take steps to balance the impact of religious symbolism by creating public spaces that encourage healthy scepticism.

Cautionary Note: Critics of nudge programmes maintain that attempts by the government to impact on the thought processes of individuals are intrusive, condescending, and in violation of individual autonomy (Oliver & Brown, 2010).

Oliver and Brown (2010) make a valid point about the inappropriateness of the government to interfere with the autonomy of the thoughts of individuals within any society. Their point, however, assumes naïvely that individuals make decisions in a vacuum, or that there are not a host of other influences (particularly, commercial ones) that intentionally design public spaces to influence the autonomy of individuals. See Stewart (2005) and Thaler and Sunstein (2008) for similar counter-arguments to Oliver and Brown's point. As Nigeria is already awash with religious symbolism that nudges individuals toward religiosity, the provision of public spaces that nudge individuals toward scepticism would serve to balance the amount of religious vs. secular situational

influences on the cognition of individuals in Nigeria.

Pros: The implementation of nudge initiatives does not require legislation; it is non-intrusive, and is often cost-effective (Rainford & Tinkler, 2011).

Contemporary Example: The Behavioural Insights Team, created by the UK government and tasked with designing and implementing nudge initiatives in the UK.

9.7.2.2 *Institutional Level*

This section will offer recommendations for educational and media institutions in Nigeria.

9.7.2.2.1 *Recommendations for educational institutions*

When and where religion is taught in educational institutions in Nigeria, it should be done comprehensively, with the level of academic depth varying according to the level of the educational institution (i.e., primary, secondary, and tertiary). Specifically, all major religions of the world should be taught, and crucially, the recorded history of the religions, and as well as the period in which these religions were created, should be taught. For instance, in Christianity, teaching students about the Roman empire's use of crucifixion as a regular form of execution will give students a better comprehension of the significance or insignificance of 'the cross'. Teaching students about the moral teachings of Confucius in China hundreds of years before Christianity, or the Egyptian civilisation thousands of years before Christianity, will give students a sense of scope.

It is often futile to encourage individuals to be sceptical, and to arrive at thought-out conclusions through the use of Type II cognitive processing, when they do not possess the knowledge which their Type II processing requires (recall the emphasis in the present thesis on separating content from process). For instance, consider a Nigerian whose view of the cosmos is shaped by lay

Christian doctrine, and who thus views Heaven and Hell as above and beneath Earth respectively. This individual would lack the knowledge (i.e., content) required to accurately contemplate (i.e., process) the size and relevance of Earth, in comparison to a Nigerian who has knowledge of the vastness of the cosmos, the billions of stars in Earth's Milky Way galaxy, the billions of other galaxies, and the billions of miles between planets (Stern, 1991; Sumi et al., 2011).

Education should purvey not propaganda (religious or otherwise) but rather known facts, accepted within the general academic community (including valid-counter points), regardless of who this knowledge might offend. Within the scientific community, the theory of evolution is the only widely-accepted account of the origin of all species. This theory should be taught at all levels of education in Nigeria, even to critics of the theory, because it is necessary to understand any theory before criticising or ridiculing it. The emphasis throughout the present thesis is not to believe in the theory of evolution because it is popular or influential, or in religious doctrine because it is intuitive or influential. Rather, the emphasis in the present thesis and the recommendation made here is the application of healthy scepticism towards all truth claims, and this type of reasoning should be encouraged in Nigerian children from as early as possible.

Evidence presented in the present thesis suggests that secular signs can help promote healthy reasoning attitudes such as scepticism. Rather than the multitude of religious signs in schools in Nigeria, having secular signs could plausibly help nudge students away from making inferentially irrational religious conclusions. These secular signs do not have to be anti-religious; scepticism is not committed to disproving religion per se, it is committed only to investigating the validity of all propositions, including religion, pseudoscience, and real science. If the perceiver of the sign has no knowledge of the sign, the signified and the intendant, then the sign will have no effect. In schools, the intendant would have to be repeatedly taught to students for them to be able to make the connection between the signifier (i.e., secular sign) and the signified (i.e., scepticism) through an acquired implicit motivation/goal for objective truth (i.e., the intendant).

Cautionary Note: Education, just like high SES, is not failproof for preventing high religiosity and religious fundamentalism. Drawing on the same examples used above, a considerable number of religion-related terrorists are well educated (Atran, 2003). Similarly, Umar Farouk Abdulmutallab, the Nigerian religion-related terrorist was educated in one of the top universities in the UK (Yusha'u, 2014).

Pros: Almost every sphere of modern life benefits from education, from the invention of mobile phones for communication to the creation of vaccines for medical intervention. Education should not be hindered or half-taught as a result of religious or other biases. It should be the fundamental right of all students to be presented with all the known facts so that they can make up their own minds about what they choose to believe. It should also be emphasized in the educational institutions of Nigeria that academia in general, and science in particular, is not predicated on faith-based beliefs but on factual evidence and falsifiable tests.

Contemporary Example: In 2014, the British government banned the teaching of creationism as evidence based theory in all free and state schools, from primary school level upwards. Teaching the theory of evolution was also made a compulsory part of the curriculum of these schools.

9.7.2.2.2 *Recommendations for media institutions*

The media institutions of Nigeria carry the huge responsibility of disseminating information throughout the country. In the Universal Declaration of Human Rights (1948), Article 19 states:

> "Everyone has the right to freedom of opinion and expression;this rightincludes freedomto hold opinions without interferenceand to seek, receive and impart information andideas through any media and regardless of frontiers" (p. 4).

Nonetheless, journalists in all democratic countries should be held to very high standards. For instance, the Code of Ethics for Nigerian Journalists (1998) mandates accuracy and fairness (Section 2) as well as social responsibility in promoting peace (Section 12). Study One in the present thesis found that the national newspapers (*Daily Sun* to a significantly larger extent, and the *Guardian* to a significantly lesser extent) published religious assertions presented as fact. This practice should be considered a breach of ethical standards. Newspaper articles with religious overtones should not interfere with the presentation of real events in putatively non-religious national newspapers.

Nigeria is currently witnessing an unprecedented amount of religion-related terrorism, with the most prominent religious terrorist group being Boko Haram. Boko Haram is affiliated with Islam and has carried out several attacks on non-Muslims (as well as on Muslims that don't fit their fundamentalist criteria). It would be more socially responsible for the media institutions to take an active role in promoting interfaith cohesion among the various religious groups in Nigeria, rather than to support the propaganda of any religious group. For instance, conspicuous media portrayal of Christianity as the only way to Heaven, and of non-Christians as heathens destined for Hell, does not serve to promote interfaith cohesion but rather reinforces the distance between Christians and Muslims.

9.7.2.3 *Individual Level*

Recognition of the predisposition to use cognitive shortcuts

The most important recommendation for the individual level is for individuals to recognise the human predisposition to use default cognitive shortcuts (Evans, 2008; Greenberg, & Solomon, 1999; Kahneman & Frederick, 2002; Posner, 1980; Smith & Collins, 2009; Wason & Evans, 1975). These cognitive shortcuts, such as various biases, stereotype knowledge, and religious doctrine learnt during childhood and reinforced throughout adulthood, provide immediate answers but might not necessarily serve the best interests of the individual.

Topics such as religion should be considered through the use of conscious and controlled Type II cognitive processing. This should entail the gathering of scientific as well as historical facts to challenge or reaffirm what has been learnt during childhood, or transmitted culturally from someone else without evidence.

Beware of situational influences on cognitive processes

Several studies outlined above indicate that relevant situational influences such as symbols can cause individuals to act in predictable ways. The series of studies carried out in the present thesis support these findings and also show how religious and secular symbols interact with specific cognitive processes, such as immortality bias, NFCC, and agency detection. It is recommended that individuals should be aware of the presence of such influences in their environments when making important decisions with lasting consequences. Individuals should also be aware of the potential effect of symbols they place around themselves (e.g., in work environments).

9.8 Concluding Remarks

Results presented above suggest that religious and secular symbols can have significant situational influences on the cognition of individuals in Nigeria. These influences often occur without the awareness of the individual, by reinforcing already learned associated constructs. Nigeria is one of the most religious countries in the world and religious symbolism is conspicuous in every sphere of Nigerian society, from work environments to educational institutions. Christianity and Islam are the two dominant religions in Nigeria and they are doctrinal. This means that they have a very high level of repetition, which leads to the tedium effect (i.e., where over-familiarity with religious doctrine leads to a deficiency in active conscious processing of the contents of the particular repeated religious doctrine).

The religion vs. rationality debate assessed through dual-process theories is often carried out in Western countries where secularism is just as conspicuous as religion. This has led many dual-process researchers to conclude that

religious people lack analytic Type II cognitive processing to engage with healthy scepticism and instead rely on heuristic Type I cognitive processing. This account however fails to explain why analytic individuals in highly religious countries are religious. A more appropriate approach to the rationality vs. religion debate through the dual process framework is to separate process (i.e., Type I and Type II processing) from content (i.e., religion and secularism). When content is separated from process, the dual-process framework can be utilized to argue that in very religious countries such as Nigeria, highly analytical individuals can use their Type II analytic cognitive processing to evaluate religious doctrine. Particularly, when these individuals do not have the necessary secular knowledge (i.e., content) to contemplate alternatives to religious doctrine (See example about the cosmos above).

Although healthy scepticism is recommended in the present thesis, this recommendation is not necessarily against any religion, if the doctrine of that religion can withstand non-biased evidence-based enquiry. By the same token, healthy scepticism should be used to assess all scientific claims. The common thread through the macro, institutional, and individual level recommendations made here is the need to nudge individuals to apply healthy scepticism, and one way to do this is through intelligent and intentionally designed public spaces with secular symbolism. An important finding in the present thesis is that caution should be applied when putting up these secular symbols because they can have different intendants for different individuals.

For individuals that score high on the detection of supernatural agency, exposure to secular symbols that create uncertainty can have the same effect as religious symbols that signify a punitive (rather than benign) God, when religious fundamentalism is assessed. Recall that the intendant is a subjective disposition toward an end goal that is attained consciously but that becomes latent and preconscious. If secular symbols are to be put in public places in Nigeria, caution should be used when putting these symbols in communities that have a high tendency to over-attribute agency to the supernatural. In these communities several educational measures should be put in place first (i.e., scientific and historical counterpoints to religion) before the use of signs to

promote scepticism. Without such educational measures, individuals in these communities might be prompted to be sceptical about secularism, because their knowledge (pro-religious) will be used to this end regardless of the process (i.e., Type I or Type II). Therefore, beyond the intelligent design of public spaces, moulding the particular intendant is crucial, so also is the need to be aware of the tendency for humans to use default cognitive shortcuts.

References

Aarnio, K., & Lindeman, M. (2007).Religious People and Paranormal Believers. *Journal Of Individual Differences*, *28*(1), 1-9. doi:10.1027/1614-0001.28.1.1

Adamolekun, K. (1999). Bereavement Salutations among the Yorubas of Western Nigeria.*OMEGA - Journal Of Death And Dying*, *39*(4), 277-285. doi:10.2190/0rm9-qbhh-y4pf-4yut

Adeboye, O. (2012). 'A Church in a Cinema Hall?'Pentecostal Appropriation of Public Space in Nigeria.*Journal Of Religion In Africa*, *42*(2), 145-171. doi:10.1163/15700666-12341227

Allport, A. (1989). Visual attention.In M. I. Posner (Ed.), *Foundation ofcognitive science* (pp. 631–682). Cambridge, MA: MIT Press.

Allport, A. (1993). Attention and control: Have we been asking the wrong questions? A critical review of twenty-five years.In D. E. Meyer & S. Kornblum (Eds.), *Attention and performance XIV: Synergies in experimental psychology, artificial intelligence, and cognitive neuroscience.*(pp. 183–218). Cambridge, MA: MIT Press.

Altemeyer, B., & Hunsberger, B. (1992).Authoritarianism, Religious Fundamentalism, Quest, and Prejudice.*International Journal For The Psychology Of Religion*, *2*(2), 113-133. doi:10.1207/s15327582ijpr0202_5

Altemeyer, B., & Hunsberger, B. (2004). RESEARCH: A Revised Religious Fundamentalism Scale: The Short and Sweet of It. *International Journal For The Psychology Of Religion*, *14*(1), 47-54. doi:10.1207/s15327582ijpr1401_4

Alter, A., & Kwan, V. (2009). Cultural sharing in a global village: Evidence for extracultural cognition in European Americans. *Journal Of Personality And Social Psychology*, *96*(4), 742-760. doi:10.1037/a0014036

Amit, A., & Sagiv, L. (2013).The role of epistemic motivation in individuals' response to decision complexity.*Organizational Behavior And Human Decision Processes*, *121*(1), 104-117. doi:10.1016/j.obhdp.2013.01.003

Anderson, H.A. (2013). *An introduction to Pentecostalism: Global Charismatic Christianity*. 2nd Ed. Cambridge University Press.

Argyle, M. (1958).*Religious behaviour*: London: Routledge; 1958.

Astuti, R., & Harris, P. L. (2008).Understanding mortality and the life of the ancestors in Madagascar.*Cognitive Science*, 32, 713–740. doi:10.1080/03640210802066907.

Atran, S. (2002).*In gods we trust:The evolutionary landscape of religion*. Oxford University Press.

Atran, S. (2003).Genesis of suicide terrorism.*Science*, 299 (5612) 1534-1539. doi: 10.1126/science.1078854

Atran, S., & Norenzayan, A. (2004). Religion's evolutionary landscape: Counterintuition, commitment, compassion, communion. *Behavioral And Brain Sciences*, *27*(06). doi:10.1017/s0140525x04000172.

Atran, S. & Sperber, D. (1991).Learning without teaching. In: *Culture, schooling and psychological development,* Ed. L. Tolchinsky-Landsmann. Ablex.

Atkinson, Q.D. & Whitehouse, H. (2011). The cultural morphospace of ritual form: Examining modes of religiosity cross-culturally, *Evolution and Human Behavior*, Vol. 32 (1) 50-62. doi: 10.1016/j.evolhumbehav.2010.09.002.

Aveyard, M. (2014). A Call to Honesty: Extending Religious Priming of Moral Behavior to Middle Eastern Muslims. *Plos ONE*, *9*(7). doi:10.1371/journal.pone.0099447

Baars, B. (1988). *A cognitive Theory of Consciousness*. Cambridge: Cambridge University Press.

Baars, B. (1997). *In the Theatre of Consciousness*. Oxford: Oxford University Press.

Bakar, A., Lee, R., & Rungie, C. (2013).The effects of religious symbols in product packaging on Muslim consumer responses.*Australasian Marketing Journal (AMJ)*, *21*(3), 198-204. doi:10.1016/j.ausmj.2013.07.002

Baldwin, J. M. (1896). A new factor in evolution.*The American Naturalist*, 30, 441– 451, 536–553.

Ball, P. (2012). Is rationality the enemy of religion? *Nature News*. Nature Publishing Group. Available from: http://www.nature.com/news/is-rationality-the-enemy-of-religion-1.10539. [Accessed: 20th April 2013].

Barber, N. (2011). A Cross-National Test of the Uncertainty Hypothesis of Religious Belief.*Cross-Cultural Research*, *45*(3), 318-333. doi:10.1177/1069397111402465

Barber, N. (2012). Country Religiosity Declines as Material Security Increases. *Cross-Cultural Research*, *47*(1), 42-50. doi:10.1177/1069397112463328

Bargh, J. A. (1982). Attention and automaticity in the processing of self-relevant information. *Journal of Personality and Social Psychology*, 43(3), 425-436. doi:10.1037//0022-3514.43.3.425

Bargh, J.A. (1994) The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In Robert S. Wyer & Thomas K. Srull (Eds.), *Handbook of social cognition* (pp. 1-40). Hillsdale, NJ: Erlbaum. (First edition 1984).

Bargh, J. A. (2006), What have we been priming all these years? On the development, mechanisms, and ecology of nonconscious social behavior.*Eur. J. Soc. Psychol*., 36: 147–168. doi: 10.1002/ejsp.336

Bargh, J.A, Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal Of Personality And Social Psychology*, *71*(2), 230-244. doi:10.1037//0022- 3514.71.2.230.

Bargh, J.A., & Chartrand, T.L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H.T. Reis & C.M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253– 285). New York: Cambridge University Press.

Barnes, K., & Gibson, N. J. (2013). Supernatural Agency: Individual Difference Predictors and Situational Correlates. *International Journal for the Psychology of Religion*, 23(1), 42-62. doi:10.1080/10508619.2013.739066

Baron, R., & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal Of Personality And Social Psychology*, *51*(6), 1173-1182. doi:10.1037//0022-3514.51.6.1173

Baron-Cohen, S., Leslie, A., & Frith, U. (1985). Does the autistic child have a "theory of mind" ?.*Cognition*, *21*(1), 37-46. doi:10.1016/0010-0277(85)90022-8.

Barrett, J., L. (2000). Exploring the natural foundations of religion.*Trends In Cognitive Sciences*, *4*(1), 29-34. doi:10.1016/s1364-6613(99)01419-9.

Barrett, J. (2004). Counterfactuality in counterintuitive religious concepts. *Behavioral And Brain Sciences*, *27*(06). doi:10.1017/s0140525x04230175

Barrett, H., & Kurzban, R. (2006). Modularity in Cognition: Framing the Debate. *Psychological Review*, *113*(3), 628-647. doi:10.1037/0033-295x.113.3.628

Barrett, J., L. (2004). *Finding agents everywhere, in Why would anyone believe in God?* AltaMira Press: Walnut Creek, CA.

Batson, C. D., & Stocks E.L. (2004). Religion: Its Core Psychological Functions. In Greenberg, J., Koole, S. L. & Pyszczynski, T. (Eds),

Handbook of Experimental Existential Psychology, (pp. 141-155). New York, NY, US: Guilford.

Baumard, N., & Boyer, P. (2013). Religious Beliefs as Reflective Elaborations on Intuitions: A Modified Dual-Process Model. *Current Directions In Psychological Science*, *22*(4), 295-300. doi:10.1177/0963721413478610.

Baumeister, R., Masicampo, E., & DeWall, C. (2011). Arguing, reasoning, and the interpersonal (cultural) functions of human consciousness. *Behavioral And Brain Sciences*, *34*(02), 74. doi:10.1017/s0140525x10002785.

Bechtel, W. (2002).Decomposing the mind-brain: A long-term pursuit.*Brain and Mind*, 3, 229–242.

Bek, J., & Lock, S. (2011). Afterlife beliefs: category specificity and sensitivity to biological priming. *Religion, Brain & Behavior*, *1*(1), 5-17. doi:10.1080/2153599x.2010.550724.

Bellow S. (1976).*To Jerusalem and back: A personal account*. USA. The Viking Press.

Bendixen, L., Schraw, G., & Dunkle, M. (1998).Epistemic Beliefs and Moral Reasoning.*The Journal Of Psychology*, *132*(2), 187-200. doi:10.1080/00223989809599158.

Bennis, W., & Medin, D. (2010). Weirdness is in the eye of the beholder. *Behavioral And Brain Sciences*, *33*(2-3), 85-86. doi:10.1017/s0140525x1000004x

Bermeitinger, C., Goelz, R., Johr, N., Neumann, M., Ecker, U. K. H., & Doerr, R. (2009). The hidden persuaders break into the tired brain. *Journal of Experimental Social Psychology*, 45, 320−326

Bering, J. (2002a). Intuitive Conceptions of Dead Agents' Minds: The Natural Foundations of Afterlife Beliefs as Phenomenological Boundary. *Journal Of Cognition And Culture*, *2*(4), 263-308. doi:10.1163/15685370260441008

Bering, J. (2002b). The existential theory of mind.*Review Of General Psychology*, *6*(1), 3-24. doi:10.1037//1089-2680.6.1.3

Bering, J., & Bjorklund, D. (2004). The Natural Emergence of Reasoning About the Afterlife as a Developmental Regularity. *Developmental Psychology*, *40*(2), 217-233. doi:10.1037/0012-1649.40.2.217.

Bering, J., Blasi, C., & Bjorklund, D. (2005). The development of afterlife beliefs in religiously and secularly schooled children. *British Journal Of Developmental Psychology*, *23*(4), 587-607. doi:10.1348/026151005x36498

Bering, J., McLeod, K., & Shackelford, T. (2005). Reasoning about dead agents reveals possible adaptive trends. *Hum Nat*, *16*(4), 360-381. doi:10.1007/s12110-005-1015-2.

Bering, J., & Shackelford, T. (2004). The Causal Role of Consciousness: A Conceptual Addendum to Human Evolutionary Psychology. *Review Of General Psychology*, *8*(4), 227-248. doi:10.1037/1089-2680.8.4.227

Bernstein, A., & Cowan, P. (1975). Children's Concepts of How People Get Babies. *Child Development*, *46*(1), 77.doi:10.2307/1128836

Blogowska, J., & Saroglou, V. (2013). For Better or Worse: Fundamentalists' Attitudes Toward Outgroups as a Function of Exposure to Authoritative Religious Texts. *International Journal For The Psychology Of Religion*, *23*(2), 103-125. doi:10.1080/87567555.2012.687991

Blose, B. L. (1981). Materialism and Disembodied Minds. *Philosophy and Phenomenological Research*, 42(1), 59. doi:10.2307/2107543

Bouissac, P. (2007). Semiotics as the science of memory.*Sign systems Studies* 35 1-2.

Boyer, P. (1994) *The naturalness of religious ideas: A cognitive theory of religion*. University of California Press.

Boyer, P. (1996). What Makes Anthropomorphism Natural: Intuitive Ontology and Cultural Representations. *The Journal Of The Royal Anthropological Institute*, *2*(1), 83. doi:10.2307/3034634.

Boyer, P. (1997) Cognitive tracks of cultural inheritance. *American Anthropologist* 100:876–89.

Boyer, P. (2000). Functional origins of religious concepts: ontological and strategic selection in evolved minds. *Journal Of The Royal Anthropological Institute*, *6*(2), 195-214. doi:10.1111/1467-9655.00012

Boyer, P. (2001). Religion explained: The evolutionary origins of religious thought. Basic Books, New York, NY.

Boyer, P. (2003). Are Ghost Concepts "Intuitive," "Endemic" and "Innate"? *Journal of Cognition and Culture,* Vol. 3 (3): 233-243. doi 10.1163/156853703322336661.

Boykoff, M. (2008). The cultural politics of climate change discourse in UK tabloids. *Political Geography*, *27*(5), 549-569. doi:10.1016/j.polgeo.2008.05.002

Brandt, M., & Reyna, C. (2010).The Role of Prejudice and the Need for Closure in Religious Fundamentalism.*Personality And Social Psychology Bulletin*, *36*(5), 715-725. doi:10.1177/0146167210366306

Broadbent, D. (1958). *Perception and communication.* London: Pergamon Press.

Bruce, S. (2011). Se*cularization: In Defense of an Unfashionable Theory*. UK: Oxford University Press.

Butler, P. M., McNamara, P., & Durso, R. (2010). Deficits in the automatic activation of religious concepts in patients with Parkinson's disease. *Journal of the International Neuropsychological Society*, 16(2), 252-261.

Buzdar, M., Ali, A., & Tariq, R. (2015). Religious orientations as a predictor of rational thinking among secondary school students. *Thinking Skills and Creativity*, *16*, 1-8. doi:10.1016/j.tsc.2014.11.005

Call, J., & Tomasello, M. (2008). Does the chimpanzee have a theory of mind? 30 years later. *Trends In Cognitive Sciences*, *12*(5), 187-192. doi:10.1016/j.tics.2008.02.010.

Calogero, M.R., Bardi, A, & Sutton, M.R. (2009). A need basis for values: Associations between the need for cognitive closure and value priorities. *Personality and Individual Differences* 46(2):154-159.

Carey, S. (1985). *Conceptual change in childhood.* Cambridge, MA: MIT Press.

Carruthers, P. (2005). Distinctively human thinking: Modular precursors and components. In P. Carruthers, S. Laurence, & S. Stich (Eds.), *The innate mind: Structure and content* (pp. 69–88). Oxford: Oxford University Press.

Carruthers, P. (2008). On Fodor-Fixation, Flexibility, and Human Uniqueness: A Reply to Cowie, Machery, and Wilson. *Mind & Language*, 23(3), 293-303. doi:10.1111/j.1468-0017.2008.00344.x

Ceci, S., Kahan, D., & Braman, D. (2010). The WEIRD are even weirder than you think: Diversifying contexts is as important as diversifying samples. *Behavioral And Brain Sciences*, *33*(2-3), 87-88. doi:10.1017/s0140525x10000063

Chandler, D. (2002). Semiotics: The Basics. Routledge, Oxon, UK.

Chen, Z., Sanchez, R., & Campbell, T. (1997). From beyond to within their grasp: The rudiments of analogical problem solving in 10- and 13-month-olds. *Developmental Psychology*, *33*(5), 790-801. doi:10.1037//0012-1649.33.5.790

Cherry, E. C. (1954). Some Further Experiments upon the Recognition of Speech, with One and with Two Ears. *The Journal of the Acoustical Society of America*, 26(4), 554. doi:10.1121/1.1907373

Chiluwa, I. (2008). Religious vehicle stickers in Nigeria: a discourse of identity, faith and social vision. *Discourse & Communication*, *2*(4), 371-387. doi:10.1177/1750481308091909

Chomsky, N. (1959). A Review of B.F. Skinner's Verbal Behaviour". *Language*. 35 (35): 26–58.

Cicchetti, D., Rogosch, F., Maughan, A., Toth, S., & Bruce, J. (2003).False belief understanding in maltreated children.*Develop. Psychopathol.*, *15*(04). doi:10.1017/s0954579403000440

CODE OF ETHICS For Nigerian Journalists. (1998). Retrieved December 10, http://www.unesco.org/fileadmin/MULTIMEDIA/HQ/CI/WPFD2009/pdf/Nigeria code_of_ethics.pdf

Cohen, E., Ejsmond-Frey, R., Knight, N., & Dunbar, R. (2009). Rowers' high: behavioural synchrony is correlated with elevated pain thresholds. *Biology Letters*, *6*(1), 106-108. doi:10.1098/rsbl.2009.0670

Cosmides, L., & Tooby, J. (1992).Cognitive adaptations for social exchange. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 163–228). Oxford: Oxford University Press.

Cousins, S. (2012). A semiotic approach to mind and culture.*Culture & Psychology*, *18*(2), 149-166. doi:10.1177/1354067x11434834

Cousins, S. (2014). The semiotic coevolution of mind and culture.*Culture & Psychology*, *20*(2), 160-191. doi:10.1177/1354067x14532331

Cowan, N. (2001). The magical number 4 in short-term memory: A reconsideration of mental storage capacity. *Behavioral And Brain Sciences*, *24*(1), 87-114. doi:10.1017/s0140525x01003922

Currie, G. (1995). Imagination and simulation: aesthetics meets cognitive science. In Davies, M. and Stone, T. (Eds), *Mental simulation: evaluations and implications*, pp. 151-169. Blackwell, Oxford.

Dennett, D. (1984). *Elbow Room*, Cambridge: MIT Press.

Deutsch, J., & Deutsch, D. (1963). Attention: Some Theoretical Considerations. *Psychological Review*, *70*(1), 80-90. doi:10.1037/h0039515

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, 56(1), 5-18. doi:10.1037//0022-3514.56.1.5

Dhami, M., & Thomson, M. (2012).On the relevance of Cognitive Continuum Theory and quasirationality for understanding management judgment and decision making.*European Management Journal*, *30*(4), 316-326. doi:10.1016/j.emj.2012.02.002

Duncan, B. L. (1976). Differential social perception and attribution of intergroup violence: Testing the lower limits of stereotyping of blacks. *Journal of Personality and Social Psychology*, 34, 590-598.

Edwards, D., & Berry, J. (1987).The Efficiency of Simulation-Based Multiple Comparisons.*Biometrics*, *43*(4), 913.doi:10.2307/2531545

Elk, M. V. (2013). Paranormal believers are more prone to illusory agency detection than skeptics. *Consciousness and Cognition*, 22(3), 1041-1046. doi:10.1016/j.concog.2013.07.004

Emmons, N., & Kelemen, D. (2014). The Development of Children's Prelife Reasoning: Evidence From Two Cultures. *Child Dev*, *85*(4), 1617-1633. doi:10.1111/cdev.12220

Epstein, S. (1985). The Implications of Cognitive-experiential Self-theory for Research in Social Psychology and Personality 1.*Journal For The Theory Of Social Behaviour*, *15*(3), 283-310. doi:10.1111/j.1468-5914.1985.tb00057.x

Epstein, S. (2003). *Cognitive-experiential self-theory of personality*.In Millon T, Lerner MJ, editors.*Handbook of psychology: Personality and social psychology*. Hoboken, NJ: Wiley. (5) 159-184.

Epstein, S., Lipson, A., Holstein, C., & Huh, E. (1992). Irrational reactions to negative outcomes: Evidence for two conceptual systems. *Journal Of Personality And Social Psychology*, *62*(2), 328-339. doi:10.1037//0022-3514.62.2.328

Epstein S, Pacini R. (1999). Some basic issues regarding dual-process theories from the perspective of cognitive-experiential theory. In *Dual-process theories in social psychology*, ed. Chaiken S, Trope Y, pp. 462-482. New York: TheGuildford Press.

Epstein, S., Pacini, R., Denes-Raj, V., & Heier, H. (1996).Individual differences in intuitive–experiential and analytical–rational thinking styles.*Journal Of Personality And Social Psychology*, *71*(2), 390-405. doi:10.1037/0022-3514.71.2.390

Eraña, A. (2012). Dual process theories versus massive modularity hypotheses. *Philosophical Psychology*, *25*(6), 855-872. doi:10.1080/09515089.2011.631994

Erving, G. (1959). *The presentation of self in everyday life*. Garden City, NY: Anchor, 1-17.

Evans JStBT. (1989).*Bias in Human Reasoning: Causes and Consequences*. Brighton: Erlbaum.

Evans JStBT, Over DE.(1996). *Rationality and Reasoning*.Hove: Psychology Press.

Evans, J. (2006). The heuristic-analytic theory of reasoning: Extension and evaluation. *Psychonomic Bulletin & Review*, *13*(3), 378-395. doi:10.3758/bf03193858

Evans, JStBT. (2007). On the resolution of conflict in dual process theories of reasoning.*Thinking & Reasoning*, *13*(4), 321-339. doi:10.1080/13546780601008825

Evans, J., & Stanovich, K. (2013a). Dual-Process Theories of Higher Cognition: Advancing the Debate. *Perspectives On Psychological Science*, *8*(3), 223-241. doi:10.1177/1745691612460685

Evans, J., & Stanovich, K. (2013). Theory and Metatheory in the Study of Dual Processing: Reply to Comments. *Perspectives On Psychological Science*, *8*(3), 263-271. doi:10.1177/1745691613483774

Faleke V., F. (2013). Semantic Critique Of The Language Of Some Religious Car Stickers In Oyo State, Nigeria. *IOSR Journal Of Humanities And Social Science*, *11*(5), 35-42. doi:10.9790/0837-1153542

Fiske, J. (1992). Popularity and the Politics of Information. In Dahlgren, P. & Sparks, C. (Eds), *Journalism and Popular Culture* (45-63). London: Sage Publications.

Fodor, J. (1983). *The modularity of mind*. Cambridge, MA: MIT Press.

Fodor, J. (2000). *The mind doesn't work that way: The scope and limits of computational psychology*. Cambridge, MA: MIT Press.

Foley, R. (1990). Fumerton's Puzzle, *Journal of Philosophical Research*. 15: 109_113. doi: 10.5840/jpr_1990_10.

Frances, B. (2015). The Rationality of Religious Beliefs.*Think*, *14*(40), 109-117. doi:10.1017/s1477175615000044

Freud, S. (1899). The interpretation of dreams. In *The standard edition of the complete psychological works of Sigmund* Freud, Vols. IV and V. London: Hogart.

Freud S. (1915). *The Unconscious*. James Strachey, translator. London: Hogarth Press; Standard Edition.

Fritz, M., & MacKinnon, D. (2007).Required Sample Size to Detect the Mediated Effect.*Psychological Science*, *18*(3), 233-239. doi:10.1111/j.1467- 9280.2007.01882.x

Gallese, V. (1998). Mirror neurons and the simulation theory of mind-reading. *Trends In Cognitive Sciences*, *2*(12), 493-501. doi:10.1016/s1364-6613(98)01262-5

Gallup. (2010). Religiosity highest in world's poorest nations.Retrieved from http://www.gallup.com.

Gantt, E., Melling, B., & Reber, J. (2012).Mechanisms or metaphors?The emptiness of evolutionary psychological explanations.*Theory & Psychology*, *22*(6), 823-841. doi:10.1177/0959354311434071

Gantt, E., & Thayne, L.,F. (2012), Once more into the breach: revisiting the metaphor of mechanism in evolutionary psychological explanations. *Journal of Theoretical and Philosophical Criminology*, 4(1), 46-53

Gendler, T. (2006).Imaginative contagion.*Metaphilosophy*, *37*(2), 183-203. doi:10.1111/j.1467-9973.2006.00430.x

Gentner, D. & Rattermann, M. J. (1991) Language and the career of similarity. In S. A. Gelman, & J. P. Brynes (Eds.) *Perspectives onLanguage and Thought: Interrelations in Development*, pp. 225-277. London: Cambridge University Press.

Goldman, A. (1989). Interpretation Psychologized. *Mind & Language*, *4*(3), 161-185. doi:10.1111/j.1468-0017.1989.tb00249.x

Goldman, A. (2006). *Simulating Minds: the Philosophy, Psychology, and Neuroscience of Mindreading.*Oxford, New York, NY: Oxford University Press.

Gopnik, A., & Astington, J. (1988).Children's Understanding of Representational Change and Its Relation to the Understanding of False Belief and the Appearance-Reality Distinction. *Child Development*, *59*(1), 26.doi:10.2307/1130386

Gopnik, A., and Meltzoff, A. N. (1997).*Words, Thoughts, and Theories*. Cambridge, MA: MIT Press.

Goswami, U.(1992). *Analogical reasoning in children.* Hillsdale, NJ : Lawrence Erlbaum Associates.

Goswami, U. (1996). Analogical reasoning and cognitive development. In H . Reese (Ed.), *Advances in child development and behavior* (pp . 92-135) . San Diego, CA: Academic Press.

Goswami, U. (2001). Analogical reasoning in children.In D. Gentner, K. J. Holyoak, & B. N. Kokinov (Eds.), The analogical mind: Perspectives

Gray, K., & Wegner, D. (2009).Blaming God for Our Pain: Human Suffering and the Divine Mind.*Personality And Social Psychology Review*, *14*(1), 7-16. doi:10.1177/1088868309350299

Green, D. M., & Swets, J. A. (1966).*Signal detection and psychophysics.* New York:Wiley.

Gribbins, T., & Vandenberg, B. (2011). Religious Fundamentalism, the Need for Cognitive Closure, and Helping. *International Journal For The Psychology Of Religion*, *21*(2), 106-114.

Guthrie, S. E. (1980) A cognitive theory of religion.*Curr.Anthropol.*21, 181–203.

Guthrie, S. E. (1993). *Faces in the clouds: A new theory of religion.*New York: Oxford University Press.

Halman, L. & Draulans, V. (2006). How secular is Europe? *British Journal of Sociology* 57(2):263–88.

Hammond, K. R. (1980). The integration of research in judgment and decision theory. Boulder: University of Colorado,*Center for Research on Judgment and Policy.*Technical Report No. 226.

Hammond, K.R (1986). A Theoretically Based Review of Theory and Research in Judgment and Decision Making.*Information for the Defense Community*. ADA164914.

Hammond KR. 1996.*Human judgment and social policy*. New York: Oxford UniversityPress.

Harris, P.L. (1991). The work of the imagination. In A. Whiten (Ed.), *Natural theories of mind: Evolution, development and simulation of everyday mindreading.*

Harris, P.L. (1992) From simulation to folk psychology: The case for development. *Mind and Language* 7, 120-44.

Harris, P., & Giménez, M. (2005). Children's Acceptance of Conflicting Testimony: The Case of Death. *Journal Of Cognition And Culture*, *5*(1), 143-164. doi:10.1163/1568537054068606

Haselton, M. G., Buss, D. M., & DeKay, W. T. (1998). A theory of errors in cross-sex mindreading. Paper presented at the *Human Behavior and Evolution Society Meeting*, Davis, CA

Haselton, M., & Buss, D. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal Of Personality And Social Psychology*, *78*(1), 81-91. doi:10.1037//0022-3514.78.1.81

Hasher, L., & Zacks, R. T. (1979).Automatic and effortful processes inmemory. *Journal of Experimental Psychology: General, 108,* 356–388.

Haslerud, G. M. (1938). Iii. Some Interrelations Of Behavioral Measures Of Frustration In Chimpanzees. *Journal of Personality*, 7(2), 136-139. doi:10.1111/j.1467-6494.1938.tb02282.x

Hayes, A. (2009). Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Communication Monographs*, *76*(4), 408-420.

doi:10.1080/03637750903310360

Hayes, A. F. 2013. *Introduction to Mediation, Moderation and Conditional Process Analysis.* New York, New York: Guilford Press

Heaton, T. (2013). Religion and socioeconomic status in developing nations: A comparative approach. *Social Compass*, *60*(1), 97-114. doi:10.1177/0037768612471772

Henare, A., Holbraad, M. & Wastell, S. (2007). Introduction: Thinking Through Things. In Henare, A., Holbraad, M. & Wastell, S. (Eds), *Thinking Through Things* (pp. 1-31). Routledge, London

Henrich, J., Heine, S., & Norenzayan, A. (2010). The weirdest people in the world?.*Behavioral And Brain Sciences*, *33*(2-3), 61-83. doi:10.1017/s0140525x0999152x

Hobbes, T. (1950). Leviathan. New York: Dutton.

Hodge, K. M. (2011). Why Immortality Alone will not get Me to the Afterlife. *Philosophical Psychology*, *24*(3), 395-410.

Hoffmeyer, J. (1997). Biosemiotics: Towards a New Synthesis in Biology *European Journal for Semiotic Studies*, Vol. 9 (2) 355-376.

Hoffmeyer, J. (2007). Semiotic scaffolding in living systems.In M. Barbieri (Ed.), Introduction to biosemiotics.The new biological synthesis (pp. 149–166). Dordrecht: Springer

Hoffmeyer, J. (2008). Biosemiotics: An examination into the signs of life and the life of signs. Scranton: University of Scranton Press.

Hofstadter, D. R. (2001).Analogy as the core of cognition.In D. Gentner, K. J. Holyoak, & B. N. Kokinov (Eds.), The analogical mind: Perspectives from cognitive science (pp. 499–538). Cambridge, MA: MIT Press/Bradford Books.

Hogg, M. A. (2007). Uncertainty-identity theory.In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 39, pp.69-126). San Diego, CA: Academic Press.

Howells, T.H. (1928). A comparative study of those who accept as against those who reject religious authority.*University oflowa Studies in Character*. 2: 7, 13.

Humphrey, N. (1998). What shall we tell the children? *Social Research*, 65, 777-805

Inzlicht, M., Tullett, A., & Good, M. (2011). The need to believe: a neuroscience account of religion as a motivated process. *Religion, Brain & Behavior*,

1(3), 192-212. doi:10.1080/2153599x.2011.647849

Irwin J. H, Dagnall, N, & Drinkwater, K. (2012). Paranormal Belief and Biases in Reasoning Underlying the Formation of Delusions. *Australian Journal of Parapsychology*, Vol. 12 (1) 7-21.

Isanbor P., O. & Ekiugbo, U., E. (2014).Socialisation of religion for advancement of culture of peace in Nigeria.*Journal of Sociology, Psychology and Anthropology in Practice*, Vol. 6, (1): 37-43.

Jaeggi, S., Seewer, R., Nirkko, A., Eckstein, D., Schroth, G., Groner, R., & Gutbrod, K. (2003). Does excessive memory load attenuate activation in the prefrontal cortex? Load-dependent processing in single and dual tasks: functional magnetic resonance imaging study. *Neuroimage*, *19*(2), 210-225. doi:10.1016/s1053-8119(03)00098-3

James, C.R. (1970). Life Magazine. 58(7):120.

James, W. (1890). Principles of psychology (2 vols.). New York: Holt.

Jary, M. (2010).Assertion and false-belief attribution.*P&C*, *18*(1), 17-39. http://dx.doi:10.1075/pc.18.1.02jar

Johnson, D., & Bering, J. (2006). Hand of God, Mind of Man: Punishment and Cognition in the Evolution of Cooperation. *Evolutionary Psychology*, *4*(1). doi:10.1177/147470490600400119

Johnson, D., & Bering, J. (2009) Hand of God, mind of man. The Believing Primate: *Scientific, Philosophical, and Theological Reflections on the Origin of Religion*: 26

Johnson, D., & Krüger, O. (2004). The Good of Wrath: Supernatural Punishment and the Evolution of Cooperation. *Polit. Theol.*, *5*(2), 159-176. doi:10.1558/poth.2004.5.2.159

Juergensmeyer, M. (1993).The New Cold War?*Religious Nationalism Confronts the Secular State*. University of California Press.

Juergensmeyer, M. (2000).*Terror in the Mind of God: The Global Rise of Religious Violence*. University of California Press.

Jung, C.G. 1959. The archetypes of the collective unconscious. London: Routledge.

Jung, C.G. 1963. Memories, dreams, reflections.Trans. R. Winston and C. Winston. Ed. A. Jaffe. New York: Pantheon Books.

Kahneman, D. (1973). *Attention and effort.* Englewood Cliffs, N.J.: Prentice-Hall.

Kahneman, D. (2011). Thinking fast and slow. Farrar, Straus and Giroux, New

York

Kahneman D,& Frederick S. (2002). Representativeness revisited: Attribute substitution in intuitive judgement. In *Heuristics and biases: The psychology of intuitive judgment*, ed. Gilovich T, Griffin D, Kahneman D, pp. 49-81. Cambridge: Cambridge University Press.

Kahneman D,& Frederick S. (2005). A model of heuristic judgment.In *The Cambridge handbook of thinking and reasoning*, ed. Holyoak K, Morrison RG, pp. 267- 294. Cambridge: Cambridge University Press.

Kahneman D, Slovic P, & Tversky A. (1982).*Judgment under uncertainty: Heuristics and biases*. Cambridge: Cambridge University Press.

Kalberg, S. (1980). Max Weber's Types of Rationality: Cornerstones for the Analysis of Rationalization Processes in History. *Am J Sociol*, *85*(5), 1145. doi:10.1086/227128

Kampis, G. (1998). Evolution as its own cause and effect. In G. Van De Vijver, S. N. Salthe, & M. Delpos (Eds.), Evolutionary systems. Biological and epistemological perspectives on selection and self-organization (pp. 255–266). Dordrecht: Kluwer Academic

Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal of Experimental Social Psychology*, 42(6), 792-798. doi:10.1016/j.jesp.2005.12.002

Kattsoff, L., & Thibaut, J. (1942).Semiotic and psychological concepts. *Psychological Review*, *49*(5), 475-485. doi:10.1037/h0054805

Kay, A., Moscovitch, D., & Laurin, K. (2010).Randomness, Attributions of Arousal, and Belief in God.*Psychological Science*, *21*(2), 216-218. doi:10.1177/0956797609357750

Killen, M., Mulvey, L.K., Richardson, C., Jampol, N, & Woodward, A. (2011). The accidental transgressor: Morally-relevant theory of mind, *Cognition*, Vol. 119, (2) 197-215, doi:10.1016/j.cognition.2011.01.006.

Kimball, C. (2002). *When Religion Becomes Evil*. San Francisco, Harper

Kirkpatrick, L. (2012). Attachment Theory and the Evolutionary Psychology of Religion.*International Journal For The Psychology Of Religion*, *22*(3), 231-241. doi:10.1080/10508619.2012.679556

Kohler, A. (2014). Semiotic coevolution by organic and sociocultural selection. *Culture & Psychology*, *20*(2), 192-202. doi:10.1177/1354067x14526896

Kosa, J., & Schommer, C. (1961). Religious Participation, Religious Knowledge, and Scholastic Aptitude: An Empirical Study. *Journal For The Scientific Study Of Religion*, *1*(1), 88. doi:10.2307/1385179

Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases.* New York: Plenum.

Kruglanski, A.W., Chun, W.Y., Erb, H.P., Pierro, A., Mannett, L., & Spiegel, S. (2003). A parametric unimodel of human judgment: Integrating dual-process frameworks in social cognition from a single-mode perspective. In *Social judgments: Implicit and explicit processes*, ed. Forgas JP, Williams KR, von Hippel W, pp. 137-161. New York: Cambridge University Press.

Kruglanski, A., & Webster, D. (1996). Motivated closing of the mind: "Seizing" and "freezing.".*Psychological Review*, *103*(2), 263-283. doi:10.1037//0033- 295x.103.2.263

Kull, K. (2000). Organisms can be proud to have been their own designers. Cybernetics and Human Knowing, 7(1), 45–55

LaBerge, D., & Samuels, S. (1974). Toward a theory of automatic information processing in reading.*Cognitive Psychology*, *6*(2), 293-323. doi:10.1016/0010-0285(74)90015-2

Lacan, J. (1978). The four fundamental concepts of psychoanalysis. New York: Norton and Company Inc.

Lacan.J. (1988). The seminar of Jacques Lacan: Book ll. The ego in Freud's theory and in the technique of psychoanalysi. New York/London: Norton. (Original work published 1978).

Ladd, K. (2007). Religiosity, the need for structure, death attitudes, and funeral preferences.*Mental Health, Religion & Culture*, *10*(5), 451-472. doi:10.1080/13674670600903064

Lancy, D. (2010).When nurture becomes nature: Ethnocentrism in studies of human development.*Behavioral And Brain Sciences*, *33*(2-3), 99-100. doi:10.1017/s0140525x10000154

Langer, Susanne K (1951): *Philosophy in a New Key: A Study in the Symbolism of Reason, Rite and Art*. New York: Mentor.

Lanman, J. (2012). The Importance of Religious Displays for Belief Acquisition and Secularization.*Journal Of Contemporary Religion*, *27*(1), 49-65. doi:10.1080/13537903.2012.642726

Leslie, M. A., Friedman, O. & German, P. T. (2004).Core mechanisms in 'theory of mind' *TRENDS in Cognitive Sciences* Vol.8 (12) 528 -533. doi:10.1016/j.tics.2004.10.001.

Leslie, A., & Polizzi, P. (1998). Inhibitory processing in the false belief task: Two conjectures. *Developmental Science*, *1*(2), 247-253. doi:10.1111/1467-7687.00038

Leslie, A., German, T., & Polizzi, P. (2005).Belief-desire reasoning as a process of selection.*Cognitive Psychology*, *50*(1), 45-85. doi:10.1016/j.cogpsych.2004.06.002

Lewes, G., H. (1875). *Problems of Life and Mind*, vol. 2. London: Kegan Paul, Trench, Turbner, and Co.

Lieberman M.D. (2003). Reflective and reflexive judgment processes: A social cognitive neuroscience approach. In *Social judgments: Implicit and explicit processes*, ed. Forgas JP, Williams KR, von Hippel W, pp. 44-67. New York: Cambridge University Press.

Lieberman, M., Jarcho, J., & Satpute, A. (2004). Evidence-Based and Intuition-Based Self-Knowledge: An fMRI Study. *Journal Of Personality And Social Psychology*, *87*(4), 421-435. doi:10.1037/0022-3514.87.4.421

Linde, G. (2013). Religion and Rationality: A Semeiotic Approach. *Toronto Journal Of Theology*, *29*(2), 299-318. doi:10.3138/tjt.1988

Lindsey E.S. & Burchinal R.M. (2013). Early executive function predicts reasoning development. Psychological Science 24 (1) 87-92.

Ling, P., 2010. McDonald's promotion: Where's the pig? In: Schiffman, D.B.L, O'Cass, A., D'Allesandro, S., Paladino, A. (Eds.), Consumer Behaviour (fifth ed.), Sydney, Pearson Australia, pp. 614–616.

Locke, J. (1970). An essay concerning human understanding, 1690. Menston: Scolar Press.

Lönnqvist, J., Walkowitz, G., Wichardt, P., Lindeman, M., & Verkasalo, M. (2009). The moderating effect of conformism values on the relations between other personal values, social norms, moral obligation, and single altruistic behaviours. *British Journal of Social Psychology*, *48*(3), 525-546. doi:10.1348/014466608x377396

Luyaluka, L., K. (2016). An essay on naturalized epistemology of African indigenous knowledge. *Journal of Black Studies*. doi: 10.1177/0021934716646043

Mack, A., Heuer, F., Villardi, K., & Chambers, D. (1985).The dissociation of position and extent in Müller-Lyer figures.*Perception & Psychophysics*, *37*(4), 335-344. doi:10.3758/bf03211356

MacKinnon, D., Lockwood, C., Hoffman, J., West, S., & Sheets, V. (2002).A comparison of methods to test mediation and other intervening variable effects.*Psychological Methods*, *7*(1), 83-104. doi:10.1037//1082-989x.7.1.83

Malley, B. (1996). The emerging cognitive psychology of religion: A review article. *Method & Theory In The Study Of Religion*, *8*(2), 109-141.

doi:10.1163/157006896x00161

Mandryk, J. & Johnstone, P. (2001).*Operation World*, 21st century edition. Cumbria: Paternoster Lifestyle.

Maran, T. & Kleisner, K (2010). Towards an evolutionary biosemiotics: semiotic selection and semiotic co-option, *Biosemiotics*, 3, 189-200

Marshall. P. (2010). The Reformation of Hell? Protestant and Catholic Infernalisms in England, c. 1560–1640. *The Journal of Ecclesiastical History,* 61:279-298

Marquette, H. (2012). 'Finding God' Or 'Moral Disengagement' In The Fight Against Corruption In Developing Countries? Evidence From India And Nigeria. *Public Admin. Dev.*, *32*(1), 11-26. doi:10.1002/pad.1605

Marx, K., (1977) *Selected Writings*. Edited by D. McLellan, Oxford: Oxford University Press.

Maryanski, A. (2010). WEIRD societies may be more compatible with human nature. *Behavioral And Brain Sciences*, *33*(2-3), 103-104. doi:10.1017/s0140525x10000191

Masicampo E. J., Baumeister R. F. (2011). Unfulfilled goals interfere with tasks that require executive functions. *J. Exp. Soc. Psychol*. 47 300–311. 10.1016/j.jesp.2010.10.011

McCauley, R. N. (2000). *The Naturalness of Religion and the Unnaturalness of Science*.Explanation and Cognition. Ed. Frank Keil, Robert Wilson. Cambridge: MIT, 2000. 61–85.

McCauley, R., N. (2003*). Is Religion a Rube Goldberg Device? Or Oh, What a Difference a Theory Makes!*Religion as a Human Capacity.Ed. Brian Wilson, Timothy Light. Leiden: Brill, 2003. 45–64

McCauley, R., & Cohen, E. (2010).Cognitive Science and the Naturalness of Religion.*Philosophy Compass*, *5*(9), 779-792. doi:10.1111/j.1747-9991.2010.00326.x

McLaughlin, M., & Sainani, K. (2014). Bonferroni, Holm, and Hochberg Corrections: Fun Names, Serious Changes to P Values. *PM&R*, *6*(6), 544-546. doi:10.1016/j.pmrj.2014.04.006

Mercier, H. (2011a). "When experts argue: explaining the best and the worst of reasoning."*Argumentation*, 23(3): 313-327.

Mercier, H. (2011b). "On the universality of argumentative reasoning."*Journal of Cognition and Culture*, 11(1-2): 85-113.

Mercier, H. (2011c). "Reasoning serves argumentation in children." *Cognitive Development*, 26(3): 177-191.

Mercier, H. (2011d). “What good is moral reasoning?” *Mind & Society* 10 (2): 131-148.

Mercier, H. and Sperber, D. (2011a). “Why do human reason? Arguments for an argumentative theory.”*Behavioral and Brain Sciences*, 34(02): 57-74.

Mercier, H. and Sperber, D. (2011b). “Argumentation: its adaptiveness and efficacy. Response to commentaries on ‘Why do human reason?’” Behavioral and Brain Sciences, 34(2): 94-111

Morgan, C. (1896). On Modification And Variation. *Science*, *4*(99), 733-740. doi:10.1126/science.4.99.733

Morris, C.W. (1993). *Symbolism and reality: A study in the nature of mind*. Amsterdam: Benjamins. (Original work published 1925).

Migliore, L.D. (2004). *Faith Seeking Understanding: An Introduction to Christian Theology*. Eerdmans Publishing, Cambridge, Uk .

Miller, G. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review*, *63*(2), 81-97.doi:10.1037/h0043158

Milligan, K., Astington, J., & Dack, L. (2007). Language and Theory of Mind: Meta- Analysis of the Relation Between Language Ability and False-belief Understanding. *Child Development*, *78*(2), 622-646.

MSI (2012).Media Sustainability Index 2012. Retrieved from http://www.irex.org/sites/default/files/u115/Nigeria%202012%20MSI%20Proof.pdf.

Musacchio, J.M. (2012). Faith and the Validation of Beliefs. Springer Books, 163-175

Musch, J., & Ehrenberg, K. (2002).Probability misjudgment, cognitive ability, and belief in the paranormal.*British Journal Of Psychology*, *93*(2), 169-177.doi:10.1348/000712602162517

Mutter, B., Alcorn, M., & Welsh, M. (2006). Theory Of Mind And Executive Function: Working-Memory Capacity And Inhibitory Control As Predictors Of False-Belief Task Performance 1. *Perceptual And Motor Skills*, *102*(3), 819-835. doi:10.2466/pms.102.3.819-835

Newsworks (2013).*Market Overview.*Data retrieved September 7, 2013, from http://www.newsworks.org.uk/Market-Overview.

Nguyen, T., & Astington, J. (2013).Reassessing the bilingual advantage in theory of mind and its cognitive underpinnings.*Bilingualism*, *17*(02), 396-409.doi:10.1017/s1366728913000394

Nieto, M., & Gamwell, F. (2015). Rethinking the relation between science and religion: some epistemological and politcial implications. *Revista De Estudios Sociales No.35*, *51*, 258-266. doi:10.7440/res51.2015.19.

Nisbett, R.E., & Norenzayan, A. (2002).Culture and cognition.In D. Medin, & H. Pashler (Eds.), Stevens' Handbook of Experimental Psychology, Vol. 2, Memory and Cognitive Processes, 3rd Edition. New York: John Wiley & Sons, Inc.

Nisbett, R., & Wilson, T. (1977).Telling more than we can know: Verbal reports on mental processes.*Psychological Review*, *84*(3), 231-259. doi:10.1037//0033-295x.84.3.231

Norris, P., & Epstein, S. (2011). An Experiential Thinking Style: Its Facets and Relations With Objective and Subjective Criterion Measures. *Journal Of Personality*, *79*(5), 1043-1080. doi:10.1111/j.1467-6494.2011.00718.x

Norris, P. & Inglehart, R. (2004).*Sacred and Secular: Religion and Politics Worldwide.* New York: Cambridge University Press.

Oliver, A. & Brown, L.D. (2010).On the use of personal financial incentives to address health inequalities.*LSE working paper*

Ordonez, X., Ponsoda, V., Abad, F., & Romero, S. (2008). Measurement of Epistemological Beliefs: Psychometric Properties of the EQEBI Test Scores. *Educational And Psychological Measurement*, *69*(2), 287-302. doi:10.1177/0013164408323226

O'Sullivan, D.,P. (2013). Inter-Faith Dialogue on How the Three Abrahamic Religions Perceive, Understand and Accept Each Other. Stamford Journal, Vol 5 (1) 108-114.

Osborn, H., F. (1896).A mode of evolution requiring neither natural selection nor theinheritance of acquired characteristics.*Transactions of the New York Academy of Science*, 15, 141–148.

Pacini, R., & Epstein, S. (1999). The relation of rational and experiential information processing styles to personality, basic beliefs, and the ratio-bias phenomenon.*Journal Of Personality And Social Psychology*, *76*(6), 972-987. doi:10.1037/0022-3514.76.6.972

Peirce, C. S. (1955). Logic as semiotic: The theory of signs. In Buchler, J. (Ed.), *Philosophical Writings of Peirce.*(Chapter seven). New York: Dover.

Peirce, C. S. (1978). *The collected papers of Charles Sanders Peirce*, Vol. II. Elements of logic.(C. Hartshorne & P. Weiss, Eds.). Cambridge, MA: Belknap.

Pennycook, G., Cheyne, J., Barr, N., Koehler, D., & Fugelsang, J. (2013). Cognitive style and religiosity: The role of conflict detection. *Mem Cogn*, *42*(1), 1-10.doi:10.3758/s13421-013-0340-7

Pennycook, G., Cheyne, J., Seli, P., Koehler, D., & Fugelsang, J. (2012). Analytic cognitive style predicts religious and paranormal belief. *Cognition*, *123*(3), 335-346. doi:10.1016/j.cognition.2012.03.003

Peterson, R. G. (2014). Why Religion Is Natural and Science Is Not: A Conversation with Robert McCauley. *Zygon*, vol. 49, no. 3.

Preacher, K. J., & Hayes, A. F. (2004). Peterson, R. G. (2014). Why Religion Is Natural and Science Is Not: A Conversation with Robert McCauley. Zygon, vol. 49, no. 3.

Preacher, K., & Hayes, A. (2004).SPSS and SAS procedures for estimating indirect effects in simple mediation models.*Behavior Research Methods, Instruments & Computers*, *36*(4), 717-731. doi:10.3758/bf03206553

Preacher, K., Rucker, D., & Hayes, A. (2007). Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behavioral Research*, *42*(1), 185-227. doi:10.1080/00273170701341316

Perkins, D. N. (1995).*Outsmarting IQ: The emerging science of learnable intelligence.* New York: Free Press.

Porter, R. (2003). Flesh in the age of reason. Penguin Books, London.

Premack, D., & Woodruff, G. (1978). Chimpanzee problem-solving: a test for comprehension. *Science*, *202*(4367), 532-535. doi:0.1126/science.705342

Posner, M. I. (2004). *Cognitive neuroscience of attention*. New York: Guilford Press.

Quek, G., & Ling, P. (2013). McDonald's apology over a pig toy: A cultural territorial clash. *Australasian Marketing Journal (AMJ)*, *21*(4), 228-233.

Rainford, P & Tinkler, J. (2011).Originally presented at Designing for nudge effects: how behaviour management can ease public sector problems, innovating through design in public sector services seminer.Series 23, LSE Public Policy Group.

Rescher, N. (1998). The Role of Rhetoric in Rational Argumentation. *Argumentation,* 12, 315-323

Richards, I., A. (1932): *The Philosophy of Rhetoric*. London: Oxford University Press Saussure, Ferdinand de ([1916] 1983): *Course in General Linguistics* (trans.Roy Harris). London: Duckworth.

Richland, L., & Burchinal, M. (2012). Early Executive Function Predicts Reasoning Development. *Psychological Science*, *24*(1), 87-92. doi:10.1177/0956797612450883

Richland, L., Morrison, R., & Holyoak, K. (2006). Children's development of analogical reasoning: Insights from scene analogy problems. *Journal Of Experimental Child Psychology*, *94*(3), 249-273. doi:10.1016/j.jecp.2006.02.002

Roets, A., & Van Hiel, A. (2011).Item selection and validation of a brief, 15-item version of the Need for Closure Scale.*Personality And Individual Differences*,*50*(1), 90-94. doi:10.1016/j.paid.2010.09.004

Ruiter, S. & van Tubergen, F. (2009). Religious attendance in cross-national perspective: A multilevel analysis of 60 countries. *American Journal of Sociology* 115(3):863–95.

Sala-i-Martin, X., & Subramanian, A. (2012). Addressing the Natural Resource Curse: An Illustration from Nigeria.*Journal Of African Economies*, *22*(4), 570-615. doi:10.1093/jae/ejs033

Saroglou, V., Corneille, O., & Van Cappellen, P. (2009). "Speak, Lord, Your Servant Is Listening": Religious Priming Activates Submissive Thoughts and Behaviors. *International Journal For The Psychology Of Religion*, *19*(3), 143-154. doi:10.1080/10508610902880063

Sasaki, J., & Kim, H. (2011). At the intersection of culture and religion: A cultural analysis of religion's implications for secondary control and social affiliation. *Journal Of Personality And Social Psychology*, *101*(2), 401-414. doi:10.1037/a0021849

Saussure, F. (1986).Bally, C., & Sechehaye, A., & Riedlinger, A. (Eds.), *Course in general linguistics.* (R. Harris, Trans.). La Salle, IL: Open Court.

Scharp, K. (2013) *Replacing Truth*. Oxford: Oxford University Press

Scherer, K. (1985). Emotions can be rational. *Social Science Information*, *24*(2), 331-335. doi:10.1177/053901885024002008

Scherer, K. (2011). On the rationality of emotions: or, When are emotions rational? *Social Science Information*, *50*(3-4), 330-350. doi:10.1177/0539018411411018

Schlinger, H.D. (2009). Theory of Mind: An Overview and Behavioral Perspective. *The Psychological Record*, 59, 435–448.

Schommer, M. (1990).Effects of beliefs about the nature of knowledge on comprehension.*Journal Of Educational Psychology*, *82*(3), 498-504. doi:10.1037//0022-0663.82.3.498

Schommer, M. (1998).The influence of age and education on epistemological beliefs.*British Journal Of Educational Psychology*, *68*(4), 551-562. doi:10.1111/j.2044-8279.1998.tb01311.x

Schommer, M. (1993).Epistemological development and academic

performance among secondary students.*Journal Of Educational Psychology*, *85*(3), 406-411. doi:10.1037//0022-0663.85.3.406

Seabeok, T., A. (1994).*An introduction to semiotics*. London: Pinter.

Shakespeare, W. (1934). Hamlet. London: J.M. Dent

Shariff, A., & Aknin, L. (2014). The Emotional Toll of Hell: Cross-National and Experimental Evidence for the Negative Well-Being Effects of Hell Beliefs. *Plos ONE*, *9*(1), e85251. .doi:10.1371/journal.pone.0085251

Shariff, A., & Norenzayan, A. (2007). God Is Watching You: Priming God Concepts Increases Prosocial Behavior in an Anonymous Economic Game. *Psychological Science*, *18*(9), 803-809. doi:10.1111/j.1467-9280.2007.01983.x

Shariff, A., & Norenzayan, A. (2011). Mean Gods Make Good People: Different Views of God Predict Cheating Behavior. *International Journal For The Psychology Of Religion*, *21*(2), 85-96. doi:10.1080/10508619.2011.556990

Shariff, A., & Rhemtulla, M. (2012). Divergent Effects of Beliefs in Heaven and Hell on National Crime Rates. *Plos ONE*, *7*(6), e39048. doi:10.1371/journal.pone.0039048

Shenhav, A., Rand, D., & Greene, J. (2011). Divine intuition: Cognitive style influences belief in God. *Journal Of Experimental Psychology: General*, *141*(3), 423-428. doi:10.1037/a0025391

Shepard, R. (1990). *Mind sights: Original Visual Illusions, Ambiguities, and Other Anomalies.* London: Palgrave Macmillian.

Sherif, M. M. (1935).A study of some social factors in perception.*Archives of Psychology (Columbia University)*, 187.

Siddiqa, A. (2010). Red hot chilli peppers Islam: Is the youth in elite universities in Pakistan radical? Lahore: *Heinrich Boel Stiftung*. 21-68.

Sirgy, J.M. (1982). Self-concept in Consumer Behaviour: A critical review.

Journal of Consumer Research. Vol. 9, 3:287-300

Sinclair, R.D. (1930). A comparative study of those who report the experience of the divine presence and those who do not.*University of Iowa Studies; Volume 168*.

Skinner, B. F. (1938). The Behavior of organisms: An experimental analysis. New York: Appleton-Century.

Sloman, S. (1996).The empirical case for two systems of reasoning. *Psychological Bulletin*, *119*(1), 3-22. http://dx.doi.org/10.1037//0033-2909.119.1.3

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. (2002). Rational actors or rational fools: implications of the affect heuristic for behavioral economics. *The Journal Of Socio-Economics*, *31*(4), 329-342. doi:10.1016/s1053- 5357(02)00174-9

Smith ER, DeCoster J. (1999). Associative and rule-based processing: A connectionist interpretation of dual-process models. In *Dual-process theories in socialpsychology*, ed. Chaiken S, Trope Y, pp. 323-360. New York: The Guildford Press.

Smith, E., & DeCoster, J. (2000). Dual-Process Models in Social and Cognitive Psychology: Conceptual Integration and Links to Underlying Memory Systems. *Personality And Social Psychology Review*, *4*(2), 108-131. doi:10.1207/s15327957pspr0402_01

Sperber, D. (1996) *Explaining Culture: A Naturalistic Approach*, Blackwell.

Sperber, D. & Wilson, D. (1986) Relevance: Communication and cognition. Cambridge, MA: Harvard University Press.

Spillmann, L. (1994). The Hermann grid illusion: a tool for studying human perceptive field organization. *Perception*, *23*(6), 691-708. doi:10.1068/p230691

Stanovich, K.E. (1999). *Who is rational? Studies of individual differences in reasoning*. Mahwah, NJ: Erlbaum.

Stanovich KE. (2004).*The robot's rebellion: Finding meaning the age of Darwin*. Chicago: Chicago University Press.

Stanovich, K. E. (2009). What IQ tests miss: The psychology of rational thought. New Haven, CT: Yale University Press.

Stanovich, K. E. (2011). *Rationality and the reflective mind*. New York: Oxford University Press.

Stanovich, K., & West, R. (2000). Individual differences in reasoning: Implications for the rationality debate?.*Behavioral And Brain Sciences*, *23*(5), 645-665. doi:10.1017/s0140525x00003435

Stanovich, K., & West, R. (2008).On the relative independence of thinking biases and cognitive ability.*Journal Of Personality And Social Psychology*, *94*(4), 672-695. doi:10.1037/0022-3514.94.4.672

Stanovich, K., West, R., & Toplak, M. (2011).The complexity of developmental predictions from dual process models.*Developmental Review*, *31*(2-3), 103-118. doi:10.1016/j.dr.2011.07.003

Stern, S. (1991). On the number of planets in the outer solar system: Evidence of a substantial population of 1000-km bodies. *Icarus*, *90*(2), 271-281.

http://dx.doi.org/10.1016/0019-1035(91)90106-4

Stewart, S., A. (2005). Can behavioural economics save us from ourselves? *The University of ChicagoMagazine,* 97:3

Sumi, T., Kamiya, K., Bennett, D., Bond, I., Abe, F., & Botzler, C. et al. (2011). Unbound or distant planetary mass population detected by gravitational microlensing. *Nature*, *473*(7347), 349-352. http://dx.doi.org/10.1038/nature10092

Taiwo, F. (2013).Transforming the Almajiri Education for the Benefit of the Nigerian Society.*Journal of Educational And Social Research*. doi:10.5901/jesr.2013.v3n9p67

Thaler, R. & Sunstein, C. (2008).*Nudge: improving decisions about health, wealth, and happiness*. Yale CN: Yale University Press.

The United Nations.(1948). *Universal Declaration of Human Rights*.

Thibaut, J., French, R., & Vezneva, M. (2010). The development of analogy making in children: Cognitive load and executive functions. *Journal Of Experimental Child Psychology*, *106*(1), 1-19. doi:10.1016/j.jecp.2010.01.001

Thompson, V. (2013). Why It Matters: The Implications of Autonomous Processes for Dual Process Theories--Commentary on Evans & Stanovich (2013). *Perspectives On Psychological Science*, *8*(3), 253-256. doi:10.1177/1745691613483476

Tooby, J. & Cosmides, L. (1995). Mapping the evolved functional organization of mind and brain. In M. Gazzaniga (Ed.), *The cognitive neurosciences.* Cambridge, MA: MIT Press.

Tracy, J., Hart, J., & Martens, J. (2011). Death and Science: The Existential Underpinnings of Belief in Intelligent Design and Discomfort with Evolution. *Plos ONE*, *6*(3), e17349. doi:10.1371/journal.pone.0017349

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, *185*(4157), 1124-1131. doi:10.1126/science.185.4157.1124

Valdesolo, P., & Graham, J. (2013).Awe, Uncertainty, and Agency Detection. *Psychological Science*, *25*(1), 170-178. doi:10.1177/0956797613501884

Van den Bos, K., van Ameijde, J., & van Gorp, H. (2006). On the Psychology of Religion: The Role of Personal Uncertainty in Religious Worldview Defense. *Basic And Applied Social Psychology*, *28*(4), 333-341. doi:10.1207/s15324834basp2804_6

Van Cappellen, P., Corneille, O., Cols, S., & Saroglou, V. (2011). Beyond Mere Compliance to Authoritative Figures: Religious Priming Increases

Conformity to Informational Influence Among Submissive People. *International Journal For The Psychology Of Religion*, *21*(2), 97-105. doi:10.1080/10508619.2011.556995

Van Huyssteen. (1999). T*he shaping of rationality: toward interdisciplinarity in theology and science*. Grand Rapids: Eerdmans

Wason, P., & Evans, J. (1974).Dual processes in reasoning?*Cognition*, *3*(2), 141-154. doi:10.1016/0010-0277(74)90017-1

Watson, P., Morris, R., Hood, Jr., R., Miller, L., & Waddell, M. (1999). Religion and the Experiential System: Relationships of Constructive Thinking with Religious. *International Journal For The Psychology Of Religion*, *9*(3), 195-207. doi:10.1207/s15327582ijpr0903_3

Waytz, A., Gray, K., Epley, N. & Wegner, M.D. (2010).Causes and consequences of mind perception.*Trends Cogn Sci.* 14 (8): 383-388. doi:10.1016/j.tics.2010.05.006.

Weber M ([1920] 2002) *The Protestant Ethic and the Spirit of Capitalism*. Los Angeles: Roxbury.

Webster, D. M., & Kruglanski, A. W. (1994).Individual differences in need for cognitive closure.*Journal of Personality and Social Psychology*, 67(6), 1049- 1062.doi: 10.1037/0022-3514.67.6.1049.

Webster, D., & Kruglanski, A. (1997).Cognitive and Social Consequences of the Need for Cognitive Closure.*European Review Of Social Psychology*, *8*(1), 133-173. doi:10.1080/14792779643000100

Weisbuch-Remington, M. (2005).The Nonconscious Influence of Religious Symbols in Motivated Performance Situations.*Personality And Social Psychology Bulletin*, *31*(9), 1203-1216. doi:10.1177/0146167205274448

Wellman, H., & Gelman, S. (1992). Cognitive Development: Foundational Theories of Core Domains. *Annual Review Of Psychology*, *43*(1), 337-375. doi:10.1146/annurev.ps.43.020192.002005

Williamson, K., Qayyum, A., Hider, P., & Liu, Y. (2012). Young adults and everyday-life information: The role of news media. *Library & Information Science Research*, *34*(4), 258-264. doi:10.1016/j.lisr.2012.05.001

Wilson, J. (2015). Metaphysical Emergence: Weak and Strong. In Bigaj, T. & Wuthrich, C. (Eds.) *Metaphysics in Contemporary Physics: Poznan Studies in the Philosophy of the Sciences and the Humanities* . Amsterdam: Rodopi.

WIN-Gallup International.(2012). Global index of religiosity and atheism. [online] Available from: http://redcresearch.ie/wp-content/uploads/2012/08/RED-C-press-release-Religion-and-Atheism-25-7-12.pdf [Accessed 20th April 2013].

Wilson TD. 2002. *Strangers to ourselves*. Cambridge, Mass.: Belknap Press.

Wimmer, H. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*(1), 103-128. doi:10.1016/0010-0277(83)90004-5

WIN-Gallup International. (2012). Global Index Of Religiosity And Atheism. Data retrieved December 10, 2013, from http://redcresearch.ie/wp-content/uploads/2012/08/RED-C-press-release-Religion-and-Atheism-25-7-12.pdf

Wober, M. (1969). The Meaning and Stability of Raven's Matrices Test Among Africans. *International Journal Of Psychology*, *4*(3), 229-235. doi:10.1080/00207596908247273

World Bank. (2013). *The World Bank. World Development Indicators*. Data retrieved September 2, 2013, from http://data.worldbank.org/country/nigeria

Wu G, Zhang J, Gonzales R. (2005). Decision under risk. In *Blackwell handbook of judgment and decision making*, ed. Koehler DJ, Harvey N, Oxford: Blackwell.

Young, C. (2009). Model Uncertainty in Sociological Research: An Application to Religion and Economic Growth. *American Sociological Review*, *74*(3), 380-397. doi:10.1177/000312240907400303

Yusha'U, M. (2014). Nigerian or British: Muslim identity and the framing of Umar Farouk Abdulmutallab in the British press. *Journal of Arab & Muslim Media Research Journal of Arab & Muslim Media Research*, 75-92

Ziv, M., & Frye, D. (2003). The relation between desire and false belief in children's theory of mind: No satisfaction?.*Developmental Psychology*, *39*(5), 859-876. doi:10.1037/0012-1649.39.5.859

Appendix A

I

RRII Questionnaire Development

The Rational Experiential Inventory (RE1-40) (Pacini & Epstein, 1999) served as major source for the choice of items, the REI-40 was specifically designed to measure preferences for the processing of information, theoretically based on Epstein's (1973) Cognitive-Experiential Self-Theory (CEST), it assess the distinction between a rational and experiential preference for information processing. This is very closely related to the distinction the research intended to assess, however, the present research is more specific in the sense that it is particularly interested in the influence of religious and superstitions beliefs, therefore the items had to be modified or invented to suite our purposes, two items were directly lifted from the REI-40 (Q11. I generally prefer to accept things as they are than question them & Q 12. It is enough for me that something gets the job done. I don't care how or why it works)*
This method of starting a questionnaire based on a previous and widely used measure is not uncommon, for instance, in the development for a new assessment of epistemological beliefs (EB), Ordon˜ez rtal., (2009) took items from Schommer's (1990, 1993, 1998) Epistemological Questionnaire (EQ) and Bendixen, Shraw, and Dunkles's (1998) Epistemic Beliefs Inventory (EBI). The ideology behind the scientific method, i.e., questioning, research, and evidence also informed the choice of questions, particularly if responses conformed to this ideology or not.

Method

14 items were developed for the Religiosity Related Logical Irrationality (RRLI) questionnaire. The items were straightforward and easy to understand statements that reflected the reality of the sample population. The items were examined by senior colleague playing a supervisory role, and changes were made based on recommendations provided. During the item generation the research questions in the main study were repeatedly referred to ensure the items in the questionnaire are representative of the hypothesis (Rattray, 2005)

and relevant literature was also consulted to ensure face and content validity

The statements were measured on a 5 point likert scale (1 = strongly agree, 5 = strongly disagree). Likert scales are generally used to measure participants attitude toward statements, with each polar end representing an unfavourable or favourable response (Brinkman, 2009). Participants had to rate each statement according to how they felt about it, examples of items include: “I generally prefer to accept things as they are rather than to question them” and “Natural disasters are an act of God to punish sinful nations”. The items were purposely overtly logically irrational to avoid any conceptual issues that might arise, as well as to expose the difference in reasoning styles we anticipated to find between participants in the different experimental treatments in the main study.

Participants

40 participants (male = 26, female = 14) were approached in Lagos State, Nigeria. All participants were Nigerian (age mean = 28 years). Many people approached refused to respond to the questionnaire, some were not sure of the purpose of the study even after explanation, and many found the questions too sensitive, hence, the low amount of respondents.

Procedure

Respondents were approached directly by the researcher, the majority of the respondents were approached at the National Library of Nigeria in Lagos States and the rest of the respondents were approached in their places of work along Herbert Macaulay Road where the library is situated. Participants were offered no incentives, although few people outside the library refused to take part, there were no dropouts, as everyone who agreed to participate completed the questionnaire. The researcher stood in close proximity while the questionnaire was being filled in, and responded in a non-biased manner to questions asked by the respondents, taking care not to influence their responses. The questionnaire took about 10 minutes to complete on average.

Results

A Principal Component Analysis (CPA) was carried out on the computer

program SPSS. Kaiser-Meyer-Olkin (KMO) analysis supported Principal Component Analysis at the lower threshold, R = .56, Kaiser (1974) recommends values from .5 and above. Barlett's test indicates that there is no breach of sphericity (χ^2 = 147.39, *df* = 91, *p*<0.001). However, the number of respondents was very low and might have compromised the analysis carried out. Kaiser criterion revealed four components with eigenvalues greater than one and Cattell scree plot criterion identified a 4-factor solution that explained 60% of the variance, see Table 2 for the list of items and component loadings.

The items in the RRLI questionnaire were conceived as a one-dimensional measure away or toward RRLI. Using a minimum factor loading of .3 most of the items loaded onto the first component (Q1, Q6, Q8, Q10, Q11, & Q14), Q2, Q4 and Q9 loaded onto both component 1 and component 4, 2 & 3, and 2 respectively, these items were not eliminated but highlighted to be reconsidered following further analysis. During the administration of the questionnaire it became clear that the items in component 2 were problematic, a large number of respondents were not sure what was meant by 'specialist meteorologist' in Q5 and 'stem-cell research" in Q3. These 2 items were therefore eliminated because they lacked clarity. Respondents also had a hard time responding to Q7, some respondents were not quite sure of the generality of the word 'event', they thought about its social denotation (e.g., party), further, Q7 loaded onto the component containing other items respondents had trouble interpreting (component 2) and a second component (component 3), it was therefore eliminated. Q12 failed to meet the criteria for minimum factor loading (0.3) on the pattern matrix, it was also one of the two items lifted word for word from the REI-40, further scrutiny revealed that although it measures the distinction in information processing between a rational and experiential orientation it might not be specific enough to tap into RRLI, which by definition is religiosity related, therefore it was eliminated. Q13 loaded unto component 3 and 4, this suggests that it might be measuring a different aspect of irrationality than RRLI, further exploration of the question revealed that it might not be specific enough and it might be more related to epistemic rationality, a subjective mode of reasoning fostered by one's beliefs as supported by one's evidence of those beliefs (Kelly 2003). The total number of items left after the elimination of unwanted was 9.

Table 1

CPA Loadings for Direct Oblimin Oblique Rotation for Initial Religiosity Related Logical Irrationality (RRLI) Questionnaire

Item	Components			
	1	2	3	4
Q 1. Faith and belief are more important than logic and reason	.78			
Q 11. I generally prefer to accept things as they are than question them	. 69			
Q 14. It is not right to question anything written in any of the holy bookssuch as the Bible or Quran	.62			
Q 10. The truth of existence is revealed in the holy religious books and noscientific endeavour can prove these facts wrong	.65			
Q 8. Accepting the events in your life by religious faith is better thanreasoning out the causes of the events	.58			
Q 6. Some dreams can predict the future	.48			
Q 9. It is not important to understand every single thing in the worldaround us	.43	.47		

(table continues)

Continued table

Item	Components			
	1	2	3	4
Q 2. It is not important to prove the things we believe and have faith in	41			.61
Q 4. Natural disasters are an act of God to punish sinful nations	.31	.47	.41	
Q 12. It is enough for me that something gets the job done. I don't carehow or why it works	.25			
Q 5. I agree with advanced weather control, where specialist meteorologistscan play God in altering weather conditions		.51		
Q 3. I agree with stem-cell research where scientists can play God inmodifying the genetic composition of humans		.72		
Q 7. I agree that every event that occurs can be reduced to physical causes			.50	.57
Q 13. Every idea we hold to be true must be repeatedly verified physicallyelse rejected			.48	.41

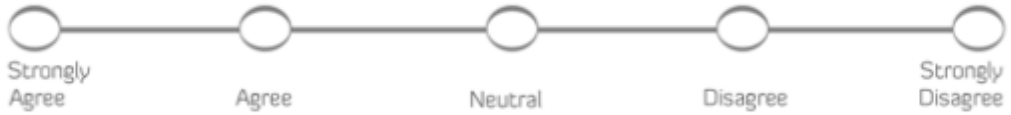
APPENDIX B: Questionnaires

I

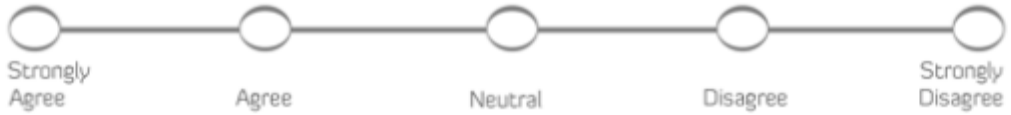
9 Item intermediate Questionnaire

PLEASE TICK THE CIRCLE YOU MOST AGREE WITH

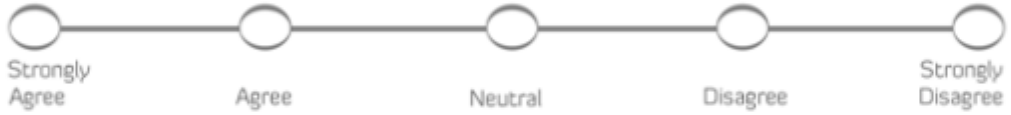
1 Faith and believe are more important than logic and reason



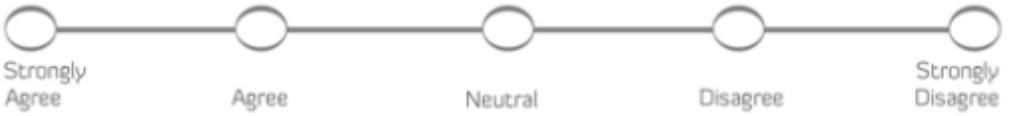
2 It is not important to prove the things we believe and have faith in



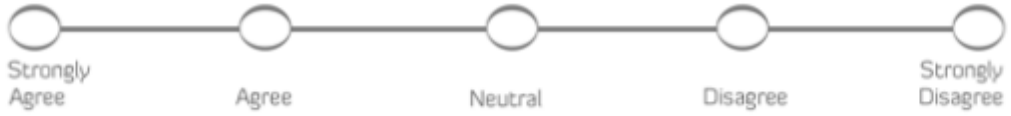
3 I agree with stem-cell research where specialist medical practitioners can play God in modifying the genetic composition of humans



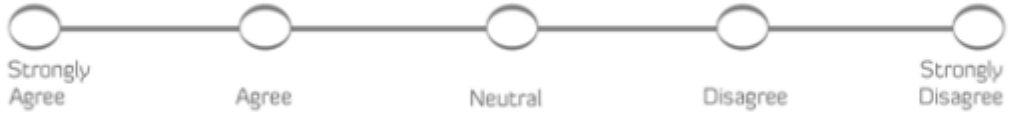
4 Natural disasters are an act of God to punish sinful nations



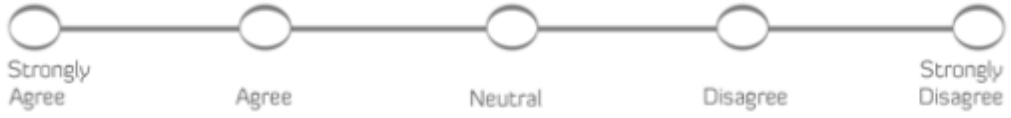
5 I agree with advanced weather control where specialist meteorologists can play God in altering weather conditions



6 Some dreams can predict the future

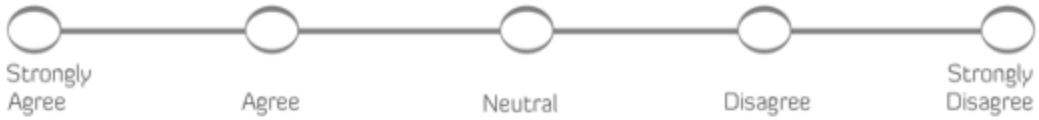


7 I agree that every event that occurs can be reduced to physical causes

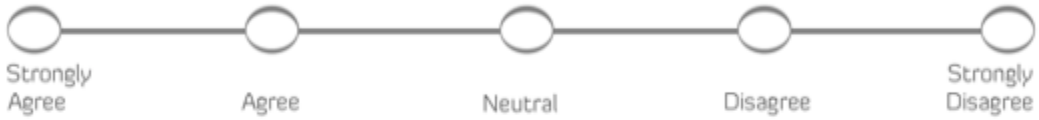


PLEASE TICK THE CIRCLE YOU MOST AGREE WITH

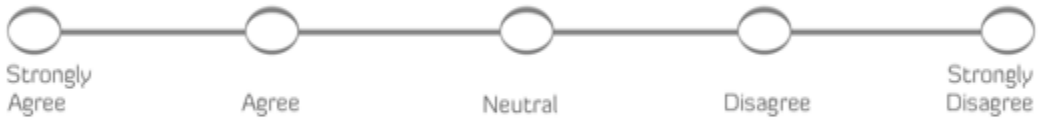
8 Accepting the events in your life by religious faith is better than reasoning out the causes of the events



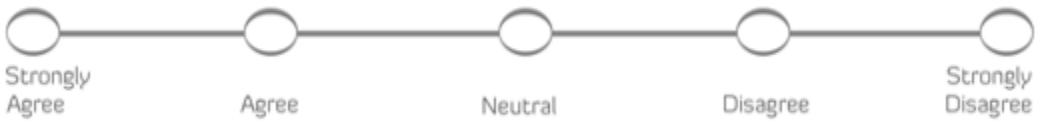
9 It is not important to try understand every single thing in the world around us



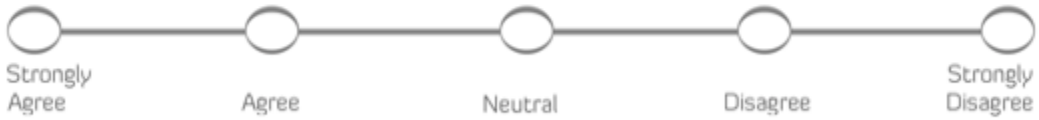
10 The truth of existence is revealed in the holy religious books and no scientific endeavour can prove these facts wrong



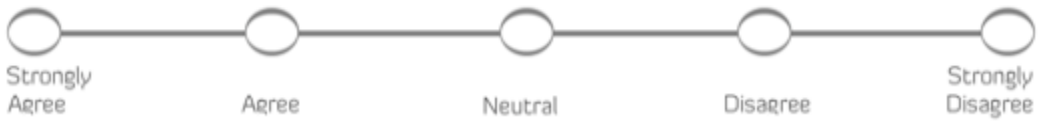
11 I generally prefer to accept things as they are rather than to question them



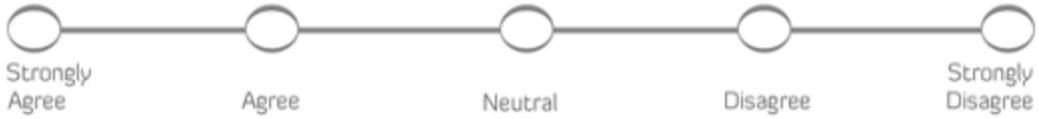
12 It is enough for me that something gets the job done, I don't care how or why it works



13 Every idea we hold to be true must be repeatedly verified physically else rejected



14 It is not right to question anything written in any of the holy books such as the Bible or Quran

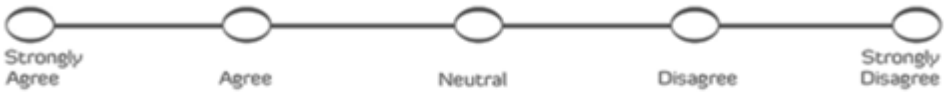


ii

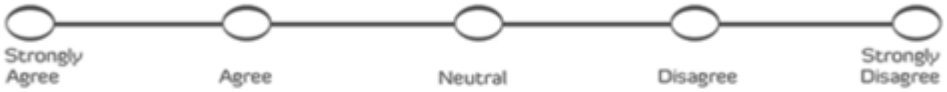
9 Item intermediate Questionnaire

PLEASE TICK THE CIRCLE YOU MOST AGREE WITH

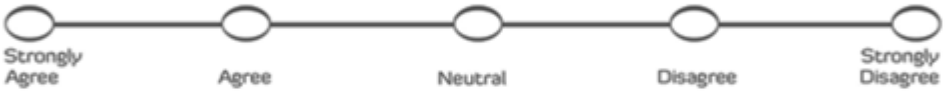
1 Faith and belief are more important than logic and reason



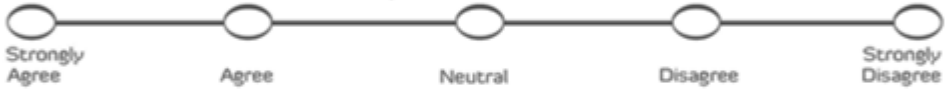
2 It is not important to prove the things we believe and have faith in



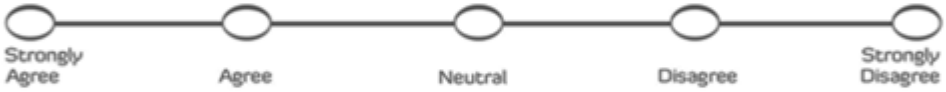
3 Accepting the events in your life by religious faith is better than reasoning out the causes of the events



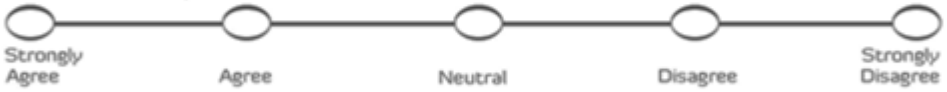
4 Natural disasters are an act of God to punish sinful nations



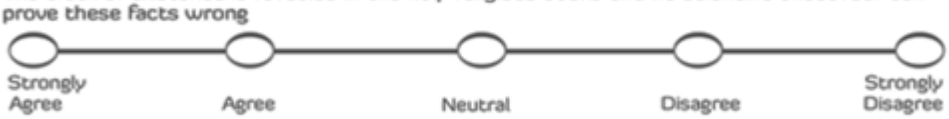
5 It is not important to try understand every single thing in the world around us



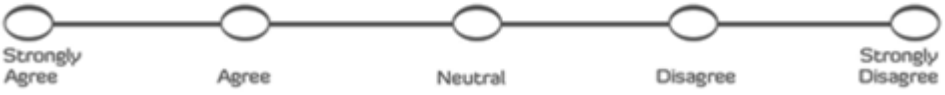
6 Some dreams can predict the future



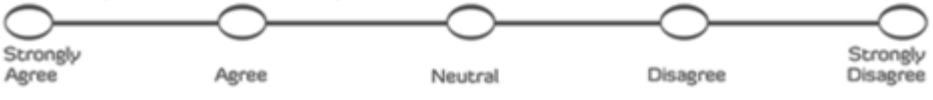
7 The truth of existence is revealed in the holy religious books and no scientific endeavour can prove these facts wrong



8 I generally prefer to accept things as they are rather than to question them



9 It is not right to question anything written in any of the holy books such as the Bible or Quran



III

7 Item Final Questionnaire

PLEASE TICK THE CIRCLE YOU MOST AGREE WITH

1. Faith and belief are more important than logic and reason

Strongly Agree Neutral Disagree Strongly Agree Disagree

2. Accepting the events in your life by religious faith is better than reasoning out thecauses of the events

Strongly Agree Neutral Disagree Strongly Agree Disagree

3. Natural disasters are an act of God to punish sinful nations

Strongly Agree Neutral Disagree Strongly Agree Disagree

4. Some dreams can predict the future

Strongly Agree Neutral Disagree Strongly Agree Disagree

5. The truth of existence is revealed in the holy religious books and no scientific endeavour can prove these facts wrong

Strongly Agree Neutral Disagree Strongly Agree Disagree

6. I generally prefer to accept things as they are than question them

Strongly Agree Neutral Disagree Strongly Agree Disagree

7. It is not right to question anything written in any of the holy books such as the Bible or Quran

Strongly Agree Neutral Disagree Strongly Agree Disagree

IV

The cognitive response test (CRT)

Please tick the right answer

1. A bat and a ball cost N1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost?

   A. N10 B. N5
   B. N2 D. N6

2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

   A. 5 minutes B. 6 minutes
   C. 10 minutes D. 4 minutes

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

   A. 37 days B. 24 days
   C. 42 days D. 47 days

V

Need for cognitive closure (NFCC) scale

15 Item NFCC Scale (Roets & Van Hiel, 2011) based on the original 42-item scale (Webster &Kruglanski,1994) and the revised version (Roets & Van Heil, 2007)

1. I don't like situations that are uncertain.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

2. I dislike questions which could be answered in many different ways.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

3. I find that a well ordered life with regular hours suits my temperament.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

4. I feel uncomfortable when I don't understand the reason why an event occurred in my life.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

5. I feel irritated when one person disagrees with what everyone else in a group believes.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

6. I don't like to go into a situation without knowing what I can expect from it.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

(Questionnaire continues)

Questionnaire continued

7. When I have made a decision, I feel relieved.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

8. When I am confronted with a problem, I'm dying to reach a solution very quickly.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

9. I would quickly become impatient and irritated if I would not find a solution to a problem immediately.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

10. I don't like to be with people who are capable of unexpected actions.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

11. I dislike it when a person's statement could mean many different things.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

12. I find that establishing a consistent routine enables me to enjoy life more.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

13. I enjoy having a clear and structured mode of life.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

14. I do not usually consult many different opinions before forming my own view.

Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

15. I dislike unpredictable situations.

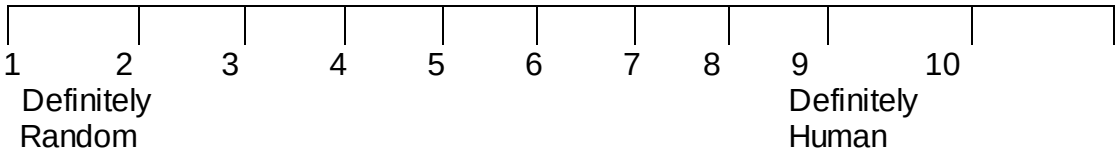
Completely disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

Detection of supernatural agency test

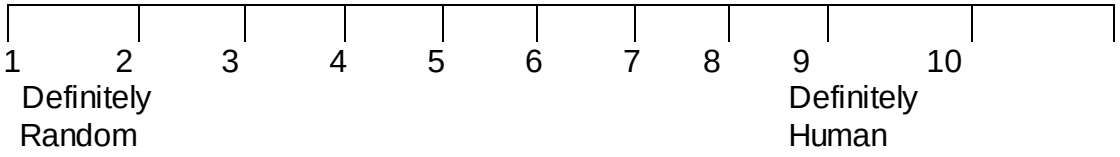
Numerical judgement task

The following series of number strings were either intentionally designed by a human or randomly generated by a computer program. Rate how you perceive each by circling the rate number from 1 (definitely random) to 10 (definitely human). The series of numbers will appear one at a time

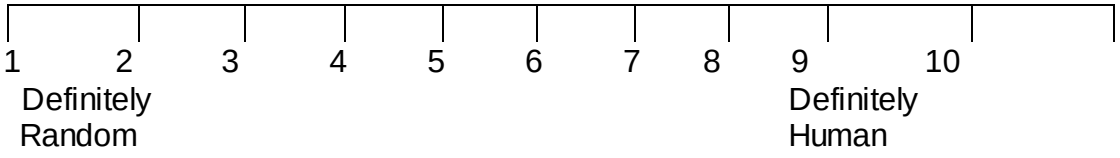
I. **1 2 1 1 2 1 2 2 2 2 2 2**



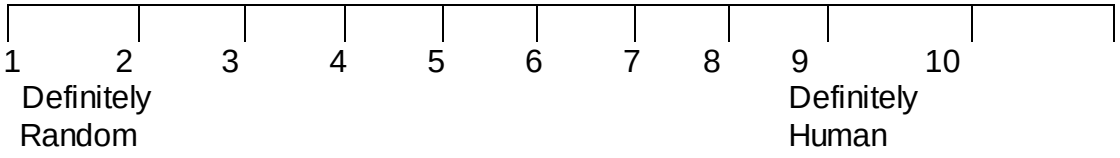
II. **2 2 1 2 2 1 1 2 1 1 2 2**



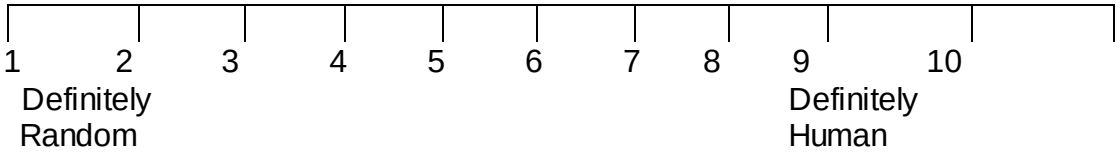
III. **1 2 1 2 2 2 1 1 2 1 2 2**



1V. **1 2 2 2 2 1 2 1 1 1 1 2**



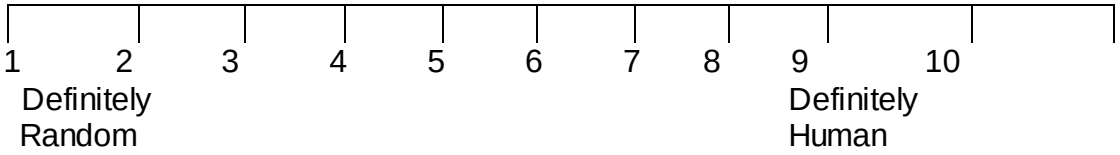
V. **2 2 2 1 2 2 1 1 2 2 2 1**



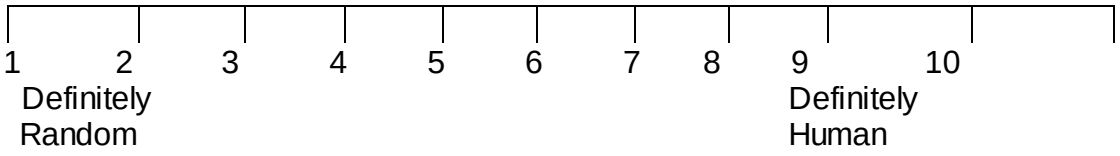
(Questionnaire continues)

Questionnaire continued

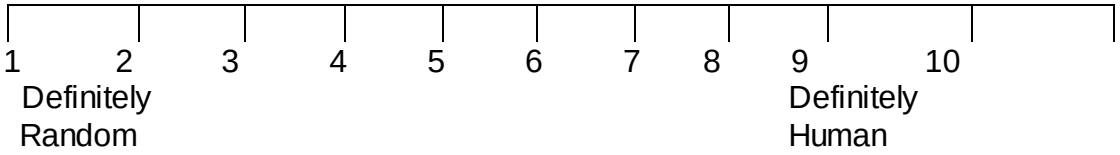
VI. **2 1 1 1 2 2 2 1 2 1 2 2**



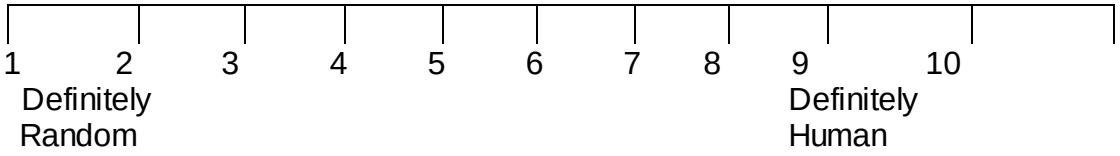
VII. **2 1 2 2 1 2 2 2 2 2 1 2**



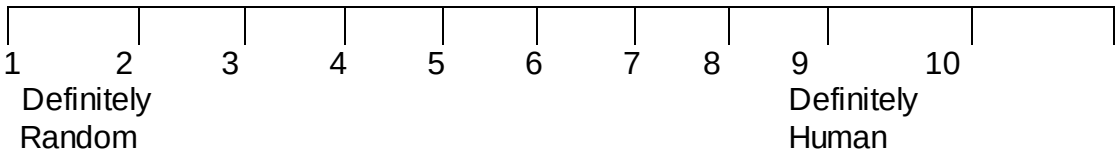
VIII. **1 1 2 1 1 1 2 2 1 2 1 1**



IX. **2 1 2 2 2 2 2 2 2 2 2 2**



X. **2 2 2 2 2 1 2 2 2 2 2 1**



VII

Detection of supernatural agency test

3 item index of belief in supernatural control **(**Kay, Moscovitch, and Laurin, 2010)

1. It is feasible that God, or some type of non-human entity, is in control, at least in part, of the events within our universe.

Tremendously doubtful	Very doubtful	Somewhat doubtful	Neither doubtful nor likely	Somewhat likely	Very likely	Tremendously likely

2. The events that occur in this world unfold according to God's, or some other non-human entity's, plan.

Tremendously doubtful	Very doubtful	Somewhat doubtful	Neither doubtful nor likely	Somewhat likely	Very likely	Tremendously likely

3. There exists a spiritual order to the universe, such as Karma

Tremendously doubtful	Very doubtful	Somewhat doubtful	Neither doubtful nor likely	Somewhat likely	Very likely	Tremendously likely

VIII

Revised religious fundamentalism scale

(Altemeyer &Hunsberger, 2004)

-4 = You **very strongly disagree** with the statement.
-3 = You **strongly disagree** with the statement.
-2 = You **moderately disagree** with the statement.
-1 = You **slightly disagree** with the statement.
0 = You **feel exactly and precisely neutral** about the statement.
1 = You **slightly agree** with the statement.
2 = You **moderately agree** with the statement.
3 = You **strongly agree** with the statement.
4 = You **very strongly agree** with the statement.

Important: You may find that you sometimes have different reactions to different parts of a statement. For example, you might very strongly disagree ("-4") with one idea in a statement, but slightly agree ("+1") with another idea in the same item. When this happens, please combine your reactions, and [record] how you feel on balance (a "-3" in this case).

1. God has given humanity a complete, unfailing guide to happiness and salvation, whichmust be totally followed.

-4	-3	-2	-1	0	+1	+2	+3	+4

2. No single book of religious teachings contains all the intrinsic, fundamental truthsabout life.

-4	-3	-2	-1	0	+1	+2	+3	+4

3. The basic cause of evil in this world is Satan, who is still constantly and ferociouslyfighting against God.

-4	-3	-2	-1	0	+1	+2	+3	+4

4. It is more important to be a good person than to believe in God and the right religion.

-4	-3	-2	-1	0	+1	+2	+3	+4

(Questionnaire continues)

Questionnaire continued

5. There is a particular set of religious teachings in this world that are so true, you can't goany "deeper" because they are the basic, bedrock message that God has givenhumanity.

-4	-3	-2	-1	0	+1	+2	+3	+4

6. When you get right down to it, there are basically only two kinds of people in theworld:the Righteous, who will be rewarded by God; and the rest, who will not.

-4	-3	-2	-1	0	+1	+2	+3	+4

7. Scriptures may contain general truths, but they should NOT be considered completely,literally true from beginning to end.

-4	-3	-2	-1	0	+1	+2	+3	+4

8. To lead the best, most meaningful life, one must belong to the one, fundamentally truereligion.

-4	-3	-2	-1	0	+1	+2	+3	+4

9. "Satan" is just the name people give to their own bad impulses. There really is *nosuchthing* as a diabolical "Prince of Darkness" who tempts us.

-4	-3	-2	-1	0	+1	+2	+3	+4

10. Whenever science and sacred scripture conflict, *science* is probably right.

-4	-3	-2	-1	0	+1	+2	+3	+4

11. The fundamentals of God's religion should never be tampered with, or compromised with others' beliefs.

-4	-3	-2	-1	0	+1	+2	+3	+4

12. *All* of the religions in the world have flaws and wrong teachings. There is *no* perfectly true, right religion.

-4	-3	-2	-1	0	+1	+2	+3	+4

IX

Retrograde immortality questionnaire

Table 1: List of retrograde immortality questions

Category	Question
Biological	Could your eyes work? Could your heart beat?
Psychobiological	Could you be thirsty? Could you be hungry?
Perceptual	Could you watch something? Could you listen to something?
Epistemic	Could you think things? Could you remember things?
Emotional	Could you feel sad? Could you feel happy?
Desire	Could you want anything? Could you desire anything?

APPENDIX C

ETHICS RELATED DOCUMENTS

I

Studies Two and Three: Informed consent sheet

Informed consent sheet: A case study of perception and cognition in Nigeria

The Department of Psychology at Brunel University requires that all persons who participate in psychology studies give their written consent to do so. Please read the following and sign it if you agree with what it says.

I freely and voluntarily consent to be a participant in the research project entitled "A Case Study of Perception and Cognition in Nigeria" to be conducted in Lagos State, Nigeria, with Mark Iruayenama Specifically, I have been told that I will be asked to determine the contents of four posters on wall followed by responding to two simple one page questionnaires. The session should take no longer than 25 minutes to complete.

I have been told that my responses will be kept strictly confidential. I also understand that if at any time during the session I feel unable or unwilling to continue, I am free to leave without negative consequences. That is, my participation in this study is completely voluntary, and I may withdraw from this study at any time. My withdrawal would not result in any penalty, academic or otherwise. My name will not be linked with the research materials, as the researchers are interested in perception and cognition in general -- not any particular individual's ideas. I have been given the opportunity to ask questions regarding the procedure, and my questions have been answered to my satisfaction. I have been informed that if I have any general questions about this project, or ethical issues relating to the project, I should feel free to contact Mark Iruayenama at Mark.Iruayenama@brunel.ac.uk.

If I have any concerns or complaints regarding the way in which the research is or has been conducted I may contact one of the Co-Chairs of the Psychology Research Ethics Committee, Professor Taeko Wydell at taeko.wydell@brunel.ac.uk or Dr Tara Marshall at tara.marshall@brunel.ac.uk.

I have read and understand the above and consent to participate in this study. My signature is not a waiver of any legal rights. Furthermore, I understand that I will be able to keep a copy of the informed consent form for my records.

_____ _____

Participant's Signature Please Print Date

I have explained and defined in detail the research procedure in which the above-named has consented to participate. Furthermore, I will retain one copy of the informed consent form for my records.

_____ _____

Principal Investigator Signature Please Print Date

II

Studies Two and Three: Consent sheet

A case study of perception and cognition in Nigeria

The Department of Psychology at Brunel University requires that all persons who participate in psychology studies give their written consent to do so. Please read the following and sign it if you agree with what it says.

I freely and voluntarily consent to be a participant in the research project entitled "A Case Study of Perception and Cognition in Nigeria" to be conducted in Nigeria, with Mark Iruayenama. Specifically, I have been told that I will be asked to determine the contents of four posters followed by responding to two simple one page questionnaires. The session should take about 15 minutes to complete.

I have been told that my responses will be kept strictly confidential. I also understand that if at any time during the session I feel unable or unwilling to continue, I am free to leave without negative consequences. That is, my participation in this study is completely voluntary, and I may withdraw from this study at any time. My withdrawal would not result in any penalty, academic or otherwise. My name will not be linked with the research materials, as the researchers are interested in perception and cognition in general -- not any particular individual's ideas. I have been given the opportunity to ask questions regarding the procedure, and my questions have been answered to my satisfaction. I have been informed that if I have any general questions about this project, or ethical issues relating to the project, I should feel free to contact Mark Iruayenama at Mark.Iruayenama@brunel.ac.uk.

If I have any concerns or complaints regarding the way in which the research is or has been conducted I may contact the chair of the Psychology Research Ethics Committee, Dr Achim Schuetzwohl at achim.schuetzwohl@brunel.ac.uk.

I have read and understand the above and consent to participate in this study. My signature is not a waiver of any legal rights. Furthermore, I understand that I will be able to keep a copy of the informed consent form for my records.

_____ _____

Participant's Signature Please Print Date

I have explained and defined in detail the research procedure in which the above-named has consented to participate. Furthermore, I will retain one copy of the informed consent form for my records.

_____ _____

Principal Investigator Signature Please Print Date

III

Studies Two and Three: Debriefing form

A case study of perception and cognition in Nigeria

The study is a psychology experiment designed to investigate the mediating role of perception on cognition, particularly how different degrees of religious symbolism and non-religious symbolism influences logical irrationality. This study is situated within the context of implicit social cognition and the automaticity of higher mental states, and this is situated within the broader context of socio-cognitive psychology.

The following hypotheses will be tested:

H1a: There would be a significant difference in RRLI scores between participants in the neutral religious condition and participants in the rationality condition

H1b: There would be a greater significant difference in RRLI scores between participants in the punitive religious condition and participants in the rationality condition compared to the difference in RRLI scores between participants in the neutral religious condition and participants in the rationality condition.

The following studies might be of interest to you:

1. Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. Journal Of Personality And Social Psychology, 71(2), 230-244

2. Dijksterhuis A.P. & Nordgren, L.F. (2006). Perspectives on Psychological Science , Vol. 1, No. 2 , pp. 95-109

Once again, thank you for taking part in this study.

IV

Studies Two and Three: Ethics Checklist / Approval

EXPEDITED REVIEW CHECKLIST,
Department of Psychology, Brunel University
Effective January 2013

This checklist, based on the Research Ethics Review Checklist from the ESRC Research Ethics Framework, was designed to help determine the level of risk or harm to participants' welfare entailed in a proposed study in the Department of Psychology at Brunel University.

This checklist should be completed for every research project by Psychology students or staff (see note below regarding staff funding applications), that involves human participants. It is used to identify whether a full application for ethics approval needs to be submitted. If a full application is required, then the University Research Ethics Committee's full Application Form for Research Ethics Approval must be used. A Word version of the full Application Form for Research Ethics Approval can be downloaded from: http://intranet.brunel.ac.uk/registry/minutes/researchethics/home.shtml.

Before completing this form, please refer to the University General Ethical Guidelines and Procedures, as well as the Code of Research Ethics (both documents can be downloaded from http://intranet.brunel.ac.uk/registry/minutes/researchethics/home.shtml). The principal investigator at Brunel University, or student supervisor, is responsible for exercising appropriate professional judgement in this review, and ensuring that correct ethics procedures are followed.

This checklist must be completed and approved before any participants are approached to take part in any research.

Having completed this form, it is possible that we may need further information from you, and in some instances you may be required to submit your plans for addressing the ethical issues raised by your proposal using the University Research Ethics Committee's full Application Form.

If you answered 'Yes' to question 12 in Section V, and the research falls outside of NHS audit procedures, then you will have to submit an application to the appropriate external health authority ethics committee after you have received provisional approval from the PsyREC.

It is your responsibility to follow the Code of Research Ethics, developed by the University Research Ethics Committee, as well as any relevant academic or professional guidelines in the conduct of your study. This includes providing appropriate documentation, and ensuring confidentiality in the storage and use of data. Any significant change in the question, design, or conduct over the course of the research should be notified to PsyREC, and may require a new application for ethics approval.

Assessed work requiring research ethics approval
Undergraduate and Masters students must retain a copy of the approved form and submit it with their research report or dissertation (bound in the Appendix); MPhil/PhD students must retain a copy of the form and submit it to the Research Degrees Board with their application for Registration. For class exercises, lecturers who have set research projects on behalf of the students will be responsible for obtaining ethics approval. All undergraduate and postgraduate work that is submitted without an approved ethics form may be subject to penalties; students must consult the appropriate module convenors for penalties regarding failure to submit approved ethics forms as part of research-based work in specific modules.

Staff research
Please note that all Psychology staff leading a project at Brunel University, whether collecting data with or without the aid of students, must submit ethics forms to PsyREC. If the ethics submission relates to staff research for which an application to an external funding agency will be/has been made, then please complete and submit the full University ethics submission form.

Risk Assessment and Criminal Record Bureau Checks (CRB)
A Risk Assessment (RA) may be necessary for your proposed research. For further information please refer to the Risk Assessment folder on Blackboard Learn

If your research involves vulnerable persons in any way, you are required to follow University guidelines for CRB checks.

Submission instructions
Please ensure all sections referring to the Principle Investigator are completed by the individual conducting the research. Please submit **two copies** of this form, completed and signed by the Principle Investigator and supervisor, to the MJ Centre.

DEPARTMENT OF PSYCHOLOGY RESEARCH ETHICS CHECKLIST
(Effective January 2013)

If the ethics submission relates to staff research for which an application to an external funding agency will be/has been made, then please complete and submit the full University ethics submission form.

Section I: Project Details

1. Project title: Religious Symbolism and the Automaticity of Temporal and Non-Conscious Religiosity-Related Logical Irrationality (RRLI) in Non-Secular Nation-States: A Case Study of Nigeria

Section II: Applicant Details

2. Name of applicant: Mark Abiye Iruayenama

3. Status (please circle): PGR Student

4. Discipline (please circle): Psychology

5. Email address: Mark.Iruayenama@brunel.ac.uk

6. Telephone number +44 7949954405

Section III: For Students Only

7. Student number: 1137686

8. Module name and number: Psychology Research (PhD)

9. Brunel supervisor's or module leader's name: Dr Michael Price

10. Brunel supervisor's email address: Michael.Price@brunel.ac.uk

Section IV: For Staff Only

x	If applicable, the student states that he or she has read the Brunel University Code of Research Ethics.
x	The topic merits further research.
x	If applicable, the student will possess the skills to carry out the research by the time that he or she starts any work which could affect the well-being of other people. He or she will be deemed to have acquired such skills on passing the relevant research skills module.
x	The informed consent and debriefing sheets are appropriate, and a copy is included in the ethics application.
x	The procedures for recruitment and obtaining informed consent are appropriate.

Please confirm the professional research ethics code that will guide the research (please circle)

BPS

☐ Yes	x No	Is a CRB check necessary for researchers/students working on this project? If yes, please confirm by ticking this box that appropriate CRB procedures will be followed ☐
☐ Yes	x No	Is a *new* Risk Assessment required for this research? If yes, please consult the information on the Psychology Ethics webpage, and attach the Risk Assessment to this submission.

PI/Staff/Supervisor signature

04 June 2013
Date

Section V: Research Checklist

Please answer each question by ticking the appropriate box:

		YES	NO
1.	Does the study involve participants who may be particularly vulnerable and/or unable to give informed consent, thus requiring the consent of parents or guardians? (e.g. children under the age of 16; people with certain learning disabilities)	☐	☒
2.	Will all participants be age 18 and over?	☒	☐
3a.	Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited?	☐	☒
3b.	If the answer to Question 3a is Yes, then will the study involve people who could be deemed in any way to be vulnerable by virtue of their status within particular institutional settings? (e.g. students at school; disabled people; members of a self-help group; residents of a nursing home, prison, or any other institution where individuals cannot come and go freely)	☐	☒
4.	Does the research involve observational/ethnographic methods?	☐	☒
5.	Will the study involve discussion by or with respondents or behaviour or drug use, where they have not given prior consent to such discussion?	☐	☒
6.	Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	☐	☒
7.	Will blood or tissue samples be obtained from participants?	☐	☒
8.	Is pain or more than mild discomfort likely to result from the study?	☐	☒
9.	Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	☐	☒
10.	Will the study involve prolonged or repetitive testing?	☐	☒
11.	Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	☐	☒
12.	Will the study involve recruitment of patients or staff through the NHS?	☐	☒
13a.	Have you undertaken this study as part of your work placement?	☐	☒
13b.	If your answer to Question 13a is Yes, then have the employers at your work placement conducted their own research ethics review?	☐	☐
14.	Does the research involve MRI, MEG, or EEG methods?	☐	☒

Give a brief description of participants and procedure (methods, tests used etc) in up to 150 words

The study will be in two independent parts with two different set of participants. The first is an implicit association test (IAT) which basically requires participants to categorize stimulus on a computer screen (images and text) according to the categories "Good" or "Bad".

The second study is a replication of a study carried out by myself last year. The study last year required participants to engage in a distraction task (making sense of 4 visual illusions) while being exposed to religious symbolism, scientific symbolism or no symbolism, afterwards participants filled in a religiosity-related logical irrationality (RRLI) questionnaire. The proposed study will replicate this study outside the confines of a controlled lab, to test if the results of the study last year will be replicated in public spaces.

Name of Applicant at Brunel University (please print): Mark Abiye Iruayenama

Signature of Applicant at Brunel University: M.I

Date: 03-06-2013

This request for expedited review has been: ☐ **Approved** (no additional ethics form is necessary)

☐ **Declined** (full University ethics form is necessary)

Signature of PsyREC Officer: _____

Date: _____

V

Study Four: Complete Ethics Checklist and Approval

Reasoning by Analogy in Nigerian School Children.

UNIVERSITY RESEARCH ETHICS COMMITTEE

APPLICATION FORM

FOR

RESEARCH ETHICS APPROVAL

SECTION A: GENERAL

1. Title of the Study:	**Reasoning by Analogy: Inference of Retrograde Immortality by Primi Future Immortality in Nigerian School Children.**		
Project Start Date:	12/10/14	Project End Date:	12/10/15

2. Full name of applicant: Mark Abiye Iruayenama					
Position Held:					
School:	School of Health and Life Sciences	Course Title (if student):		Psychology Research (PhD)	
Email:	Mark.Iruayenama@brunel.ac.uk	Telephone:	07949954405	Fax:	
Please provide details of any and all other researcher(s) who will work on the research project:					
Name(s):	Mark Abiye Iruayenama				
Position Held:	PhD candidate				
Location:	Gaskell Building				
Contact details (e-mail/ telephone/fax):	Mark.Iruayenama@brunel.ac.uk				
Name(s):					
Position Held:					
Location:					
Contact details (e-mail/ telephone/fax):					
Name(s):					
Position Held:					
Location:					
Contact details (e-mail/ telephone/fax):					

3. Is this a student proposal?	Yes	*	No	
If yes, please complete the remainder of this section.				

Supervisor Name:	Dr Michael E. Price	Position held:	Senior Lecturer and Deputy Head of Psychology, Brunel University, London
Location:	Gaskell Building		
Contact details (email/telephone/fax):	michael.price@brunel.ac.uk		

4. Declaration to be signed by the Applicant or the supervisor in the case of a student:

1.2 I confirm that the research will be undertaken in accordance with the Brunel University Ethical Framework, Good Research Practice Policy, and Code of Research Ethics.

1.3 I will undertake to report formally to the relevant University Research Ethics Committee for continuing review approval.

1.4 I shall ensure that any changes in approved research protocols are reported promptly for approval by the relevant University Ethics committee.

1.5 I shall ensure that the research study complies with the law and Brunel University policies on the use of human material (if applicable) and health and safety.

1.6 I am satisfied that the research study is compliant with the Data Protection Act 1998, and that necessary arrangements have been, or will be, made with regard to the storage and processing of participants' personal information and generally, to ensure confidentiality of such data supplied and generated in the course of the research.

(Note: Where relevant, further advice is available from the Information Access Officer, e-mail data-protection@brunel.ac.uk).

1.7 I will ensure that all adverse or unforeseen problems arising from the research project are reported in a timely fashion to the Chair of the relevant University Research Ethics Committee.

1.8 I will undertake to provide notification when the study is complete and if it fails to start or is abandoned.

1.9 I have met and advised the student on the ethical aspects of the study design and am satisfied that it complies with the current professional (*where relevant)*, School and University guidelines.

Signature of Applicant: …M.A.I……. Date: ……8/10/14…….

Signature of Supervisor:……Michael Price..... Date……9/10/14……

SECTION B: FUNDING

5. If the research is externally funded, what is the source of the funding? No

5.1. Are there any conditions attached to the funding?

YES		NO	*	

If yes, please specify.

SECTION C: THE RESEARCH

6. In **lay terms**, please provide an outline of the proposed research, including:

1.10 background
1.11 objectives
1.12 research methodology
1.13 contribution of research
1.14 justification of benefit

(*max 1000 words)*.

Reasoning by Analogy: Inference of Retrograde Immortality by Priming Future Immortality in Nigeria

School Children.

Background

Within the cognitive science of religion (CSR) there has been some interest on how the conceptualization of fu immortality (i.e., life after death) reveals intuitive patterns of reasoning about personhood (e.g., Bering, 2002; Bering & Bjorklund, 2004). Responses to questions on future immortality however are often informed by religi or cultural narratives, even in studies carried out with children, demonstrated by assessing the influence of religi vs. secular primes (Astuti & Harris, 2008; Harris & Giménez , 2005). To address this shortcoming, Emmons an Kelemen (2014), in a cross-cultural study (urban Ecuador vs. rural Shaur) assessed children's conceptualization retrograde immortality (i.e., life before birth). This novel approach reduces the chances of culturally acquired

responses in children in cultures with no dominant retrograde immortality script.

Objectives

The proposed study aims to contribute to this body of knowledge in two ways: First, by replicating Emmons a Kelemens (2014) cross-cultural retrograde immortality study in a different culture (Nigeria) which showed tha children aged from five to 12 years old got older they were just as likely to believe in biological immortality as younger children but less likely to believe in biological immortality. Second, and novel to the present study, by assessing if children's ability to reason by analogy will make them conceptualize retrograde immortality more primed with future immortality symbolism (in comparison with children primed with secular symbolism).

Research Methodology

Children (5 yrs – 12 yrs) will be tested in an unoccupied classroom individually, within their school premises. will be introduced to the study by telling them that they will be asked questions about the past and things they do then. The experimenter will inform the children that the questions will not be graded, and are not part of a t

Children will be presented with three drawings representing three developmental periods in their past (Emmon Kelemen, 2014). The images consist of culturally appropriate renditions of a Nigerian woman and infant (see Appendix II). The three images include: a pre-life image (depiction of a young mother), an in utero image (depiction of a pregnant mother), and a baby period image (depiction of a baby). The images will be presented children following the procedure set out by Emmons and Kelemen (2014). Crucially, and novel to the present two sets of images will be presented to the children; one containing religious symbolism and another containin secular symbolism (see Appendix III).

According to experimental condition (religious symbolism vs. secular symbolism), all three images will be init laid out on the table linearly (i.e., prelife period, in utero fetal period, and baby period). Children will be told t imagine the drawings are of themselves and their mother. The baby period will be discussed first (while pointin the drawing of the baby), followed by the in utero fetal period (explaining that that they were in their mother's belly), and lastly the pre-life period (explaining that it was before they were born). After the introduction of the

drawings, they (the drawings) will be mixed up and the children will be asked to order them linearly to ascerta they understand that the drawings represent three distinct stages of their past. If any child fails to order the ima correctly the order of the images will be reviewed and the child will be given a second chance to answer.

When the three different drawings have been understood by the child, the pre-life image alone (religious symb vs. no symbolism) will be laid down on the table and the child will be asked 12 "yes-no" questions about men bodily functions they might have had during their pre-life period. (See Appendix IV for the list of questions). A questions will be prefaced the following way: "Think about yourself during this time when your mother still w pregnant with you. During that time (Could you feel happy?)".

Contribution of Research

Findings from the research will contribute toward the cognitive science of religion's claim that humans posses implicit intuitive patterns of reasoning engaged by explicit concepts acquired through cultural transmission (e. Atran & Norenyazan, 2004; Barrett, 2000, 2004; Guthrie, 1993). If the predictions are correct, and novel to th proposed research, it will also show that children are able to reason by analogy about untutored religious conceptions based on their knowledge of tutored religious concepts (when primed with tutored religious conce

Justification of Benefit

The study aims to demonstrate that religious symbolism serves not only reinforce tutored religious concepts bu also influence the conceptualisation of untutored religious concepts. This will provide further support for the c within the cognitive science of religion that humans possess implicit intuitive patterns of reasoning about personhood which cultural narratives (e.g., religion) exploit.

Attach any questionnaires, psychological tests, etc.

7. Who originated the study?

The researcher (Mark Iruayenama) as an extension of Emmons and Kelemen's (2014) study, which also an extension of Bering and Bjorklund's (2004) study.

8. Location of study

8.1 Where will the study take place?
Nigeria
8.2 If the study is to be carried out overseas, what steps have been taken to secure research and ethical permission in the country of study? (Please attach evidence of approval if available.)
The research is to be carried out in a private school in Nigeria, currently the school has no ethics committee to grant ethical approval. However, I have discussed in depth with the school proprieto teachers about the nature of the research, as well as given out documents explaining the procedu be followed. After this process I obtained permission to carry out the research with the school (se Appendix I).

9. Multi-centre and off-campus studies

If this is a multi-centre or off-campus study, please answer the appropriate questions below; otherwise, go to Question 10.

9.1 Does this project involve a consortium (other research partner organisations)?

YES		NO	*	

If yes, please complete the details below in Question 9.2.

9.2 Who has overall responsibility for the study?

Brunel University

Please provide details of the contractual agreement between Brunel University and the other organisation(s).

9.3 Is this an off-campus study?

YES	*	NO		

If yes, please provide signed, written permission from an appropriate level of management wi the relevant organisation(s). See appendix I

10. Has approval been sought from other Ethics Committees and LRECs?

YES		NO	*	

Please enclose copies of approval letters, where applicable.

11. If appropriate, has the protocol been reviewed by a statistician?

YES		NO	*	

If yes, give the name of the statistician:	
Position held:	

11.1 Define *(where necessary)* the statistical power of the study.

12. Who will have overall control of the data generated?

The researcher (Mark Iruayenama) / Brunel University

13. How do you propose to disseminate the results of your research?

Dissertation / academic journal

14. PROCEDURES

Please state whether the project includes procedures which: (*please tick the appropriate box)*

	YES		
a. are physically invasive;			
b. involve the use of human tissue or taking of bodily samples;			
c. involve the use of biological, radiological, chemical or hazardous substances;			
d. are psychologically/socially intrusive.			

If you have answered YES to any of the questions in 14 above, please complete questions 15 and 16; otherwise proceed to question 17. You must also consult the Head of Risk and Radiation to ensure compliance with Health and Safety regulations.

15. Specific procedures involved:

Include details, as applicable, of:

-the dosage and route of administration of the drug(s) used in and under research, other substances and/or appliances to be administered/use the method of administration or use,

-measurements and samples to be taken;

-tests to be performed;

-the use of visual aids or the administration of psychological tests.

15.1 Might the procedure(s) cause pain, distress, disruption or intrusion to a participant?

YES		NO		

If yes, please explain.

15.2. Are there any particular requirements or abstentions which will be imposed upon the particip
(e.g., multiple visits, abstention from alcohol, tobacco, etc.)?

YES		NO		

If yes, please explain.

16. If tissue and/or samples are to be taken, please state the nature, amount and frequency.

16.1 What arrangements will be made for the storage of the tissue and/or samples and for disposal the end of the study?

17. Products and devices

17.1 Does the research involve the testing of a product or device?

YES		NO	*	

If yes, please describe it.

17.2 If this research involves a drug, is it being used in accordance with its licensed uses?

YES		NO	*	

If no, please explain why:

The research does not involve use of a drug

SECTION D: THE PARTICIPANTS

For the purposes of this section, "participants" include human subjects, their data, their organs and tissues. For participants to be recruited to the research, please state:

18. the number of participants:	160

19. if data are to be collected on different sites, please state the number of participants at each site:

Site 1:		Number of participants:	
Site 2:		Number of participants:	

(insert additional sites if necessary)

20. How have you arrived at this number? Please state proposed inclusion/exclusion criteria.

The participants will be made up of four distinct age groups, each group will require a minimum of 3 participants. The figure (160) was arrived at estimating 40 participants per age group.

5 - 6 year olds = 40

7 – 8 year olds = 40

9 – 10 year olds = 40

11 – 12 year olds = 40

The inclusive criteria will be that participants understand the task and the exclusion criteria will be fa of participant to understand the task after two detailed explanations, and falling out of the population sample age range (5- 12 years old).

21. Age group or range *(e.g., under 60s*)**:**	5- 12 year olds					
22. Sex:	Male	Not pre-determined		Female	Not pre-determined	

23. Do participants belong to any of the following vulnerable groups?

Children:	**YES**	*	**NO**		

Participants unable to give informed consent in their own right *(e.g., people with learning difficulty)*:

	YES		**NO**	*	

Other vulnerable groups*(e.g., mental illness, dementia, students, refugees, unemployed, prisoners)*:

	YES		**NO**	*	

The above list is indicative, not definitive. Care will need to be taken to formulate inclusion/exclusio criteria that clearly justify why certain individuals are to be excluded, to avoid giving the impression unnecessary discrimination. On the other hand, the need to conduct research in "special" or "vulner groups should be justified and it needs generally to be shown that the data required could not be obtained from any other class of participant.

If the answer to any of the aboveis yes, please complete Questions 24 to 28; otherwise proceed to Question 29.

24. Please explain why it is necessary to conduct the research in such vulnerable participants and whether required data could be obtained by any other means.

The nature of research centres around assessing untutored conceptualisation of personhood ba intuition. Children have been used across a number of studies to assess this construct because children are less likely to be familiar with (other) cultural narratives of retrograde immortality, l responses will be predominantly based on intuition.

25. Please state what special or additional arrangements have been made to deal with issues of c and the procedures to safeguard the interests of such participants.

1. A consent form will be given to children to take home to their parents to sign
2. A language appropriate consent form will be given to children to sign

26. Please describe the procedures used to ensure children (i.e., persons under 18 years) are able provide consent/assent to participation.

Consent will be sort from both the parents of the children and the children on two seperate cor forms (see Appendices VI and VII). If either or both a child and parent refuse to sign the conser that child will be excluded from the study and reassured that he/she will face no negative consequences; academic or otherwise.

27. If appropriate, please state whether and how parental consent, or the consent of the legal gua and/or order/declaration of the court, will be sought in relation to the participation of children in research.

Both the information sheet and parent's consent form will be given to the teacher responsible f every school year to give to the children in their respective years. The teachers will instruct the children to give the information sheet and consent form to their parents / legal guardians, and the signed (or unsigned documents) back. The teachers will be further instructed not to persist child fails to return his/her signed/unsigned consent sheet for any reason. However, if a child re for another information sheet and consent form due to misplacing the ones that were given to him/her that child will be given the same set of information sheet and consent form to take hor

28. If the participant is unable to consent in their own right, will you seek the prior approval of an informed independent adult and any other person or body to the inclusion of the participant in the research?

	YES	*	NO		

State precisely what arrangements will be put in place.

The headmaster of the primary school, who is the overall head in charge of the children while a will be explicitly informed about the background of the study as well as the predictions of the s He will then make the informed choice of approval (or disapproval).

Recruitment and Selection

The Research Ethics Committee will need to be satisfied with the effectiveness and propriety of recru and selection procedures given the participant involved, e.g., that the participant will not feel in any obliged to take part, that advertisements do not appear to offer inducements. The Committee will b particularly interested in cases where a participant's relationship with the investigator could raise iss about the voluntary status or motive of the participant's involvement in the research (e.g., students).

29. How will the participants in the study be selected, approached and recruited (please indicate the inclusion and exclusion criteria)?

The headmaster of the school will inform individual teachers in charge of various classes, and the teachers will inform the children (crucially adding that they are not being academically assessed).

The inclusive criteria will be that participants understand the task and the exclusion criteria will be fa participant to understand the task after two detailed explanations, and falling out of the population sa age range (5- 12 years old).

If you are proposing to advertise, please attach a copy of the advert to be used.

30. Where are you recruiting the participants? From their primary school

31. Relationship of participant to investigator:	None				
32. Will the participants take part on a fully voluntary basis?					
	YES	*	**NO**		
33. Will Brunel University students be involved as participants in the research project?					
	YES		**NO**	*	

If yes, please provide full details.

34. Will payments or other inducements be made to participants?

	YES		**NO**	*	

If yes, give amounts, type and purpose.

No payments will be made to the participants, however, a desktop computer will be donated to t school.

Information to Participants and Consent

35. Will participants be informed of the purpose of the research?

	YES	*	**NO**		

If no, please explain why.

36. Will the participants be given a written information sheet?

	YES	*	**NO**		

If yes, attach a copy.

If no, please explain why. The participation sheet will be signed by the headmaster on behalf of the children, however, before participation the information and consent sheet will be read out to the ch so they understand that they are free to leave without consequence.

37. Will written consent be obtained?

	YES	*	**NO**		

If yes, attach a copy of consent form.

If no, please explain why.

38. Where potential participants will/may suffer from any difficulties of communication, state the me to be employed both to present information to the participants and achieve consent. If written, please a copy.

English language is the first language in Nigeria and all academic work is carried out through t English language. Hence, no difficultly is communication is anticipated. Any child who fails to understand the questions after two detailed explanations will be excluded from the study.

39. Please state how you will bring to the attention of the participants their right to withdraw from t study without penalty.

Before commencing the information sheet and consent sheet will be read out to participants and ea participant will be given the opportunity to ask questions.

Where relevant:

39.1 Will information be given to the participants' GP (if deemed necessary)?

	YES		**NO**	*	

39.2 Have the participants consented to having their GP informed?

	YES		**NO**	*	

40. Please state what measures will be taken to protect the confidentiality of the participant's data (arising out of the research and contained in personal data).

No names will be linked with the study or data collected.

41. How long will the data be retained following completion of the study?

Ten years

42. How will participants be informed of the results of the study if they so wish?

If the report is published in an academic journal the headmaster will be informed about it. If the headmaster or any of the parents of the children are interested in seeing the results, a copy will b out to everyone that requests for it.

SECTION E: RISKS AND HAZARDS

43. Risk to research participants

43.1 Do you think there are any ethical problems or special considerations with the proposed stud

	YES		**NO**	*	

If yes, please give details:

43.2 Are there any potential hazards or risks to participants?

	YES		**NO**	*	

If yes, please specify them and state what precautions have been taken to minimise and deal with them:

44. Risk to researchers

44.1 Are there any potential hazards or risks for the researchers and others associated with participation

research (as distinct from the research participants)?

	YES		**NO**	*	

If yes, specify them and state what precautions have been taken to minimise and deal with them.

45. Has a Health & Safety risk assessment been carried out?

YES	*	NO		

SECTION F: COMPENSATION FOR DEATH OR PERSONAL INJURY

46. Is Brunel University providing indemnity for compensation in the event of personal injury or deat arising out of participation in the research?

	YES	*	**NO**		

47. If the insurance cover is not being provided by Brunel University, please provide written confirma that you have insurance cover for negligent and non-negligent harm.

48. Has a manufacturer provided commercial equipment and/or mechanical devices?

	YES		**NO**	*	

If yes, please state what arrangements have been made to compensate or provide indemnity in the of personal injury or death arising from the use of the equipment or mechanical devices.

SECTION G: CONFLICT OF INTEREST AND INTELLECTUAL PROPERTY

49. Are there any potential conflicts of interest arising from the project, deriving from relationships w collaborators/sponsors/participants/interest groups?

	YES		**NO**	*	

Please disclose all relevant personal and commercial interests.

50. Does the project require access to intellectual property rights (IPR) belonging to third parties?

	YES		**NO**	*	

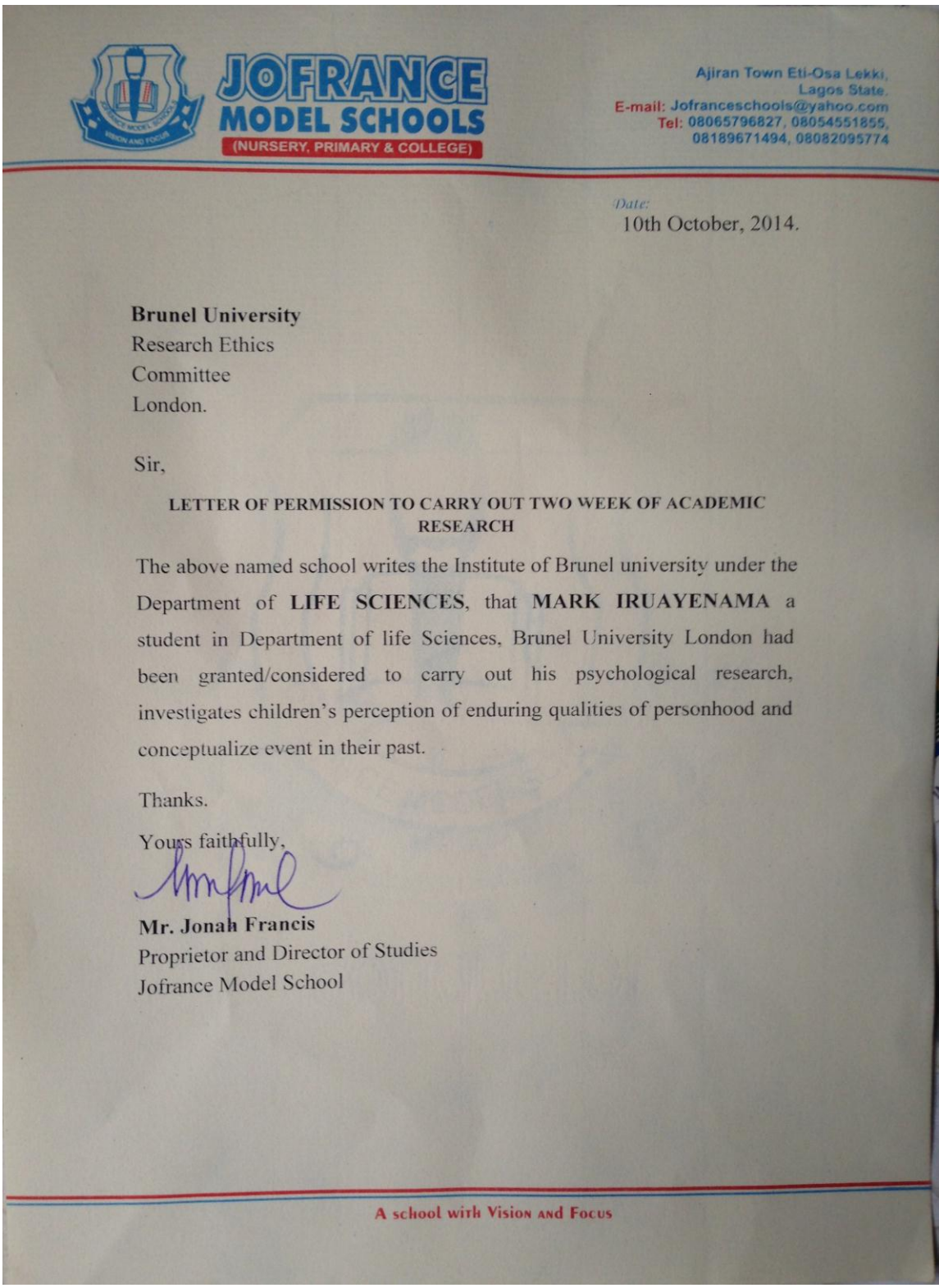
50.1 If yes, has use of such IPR been cleared with the relevant owners?

	YES		**NO**		

51 Are arrangements in place to ensure the proper attribution and acknowledgement of inventive contributi

the project by all participants/collaborators?					
	YES		**NO**	*	
If yes, please provide evidence of this.					

Permission from an Appropriate Level of Management



JOFRANCE MODEL SCHOOLS
(NURSERY, PRIMARY & COLLEGE)

Ajiran Town Eti-Osa Lekki,
Lagos State.
E-mail: Jofranceschools@yahoo.com
Tel: 08065796827, 08054551855,
08189671494, 08082095774

Date:
10th October, 2014.

Brunel University
Research Ethics
Committee
London.

Sir,

LETTER OF PERMISSION TO CARRY OUT TWO WEEK OF ACADEMIC RESEARCH

The above named school writes the Institute of Brunel university under the Department of **LIFE SCIENCES**, that **MARK IRUAYENAMA** a student in Department of life Sciences, Brunel University London had been granted/considered to carry out his psychological research, investigates children's perception of enduring qualities of personhood and conceptualize event in their past.

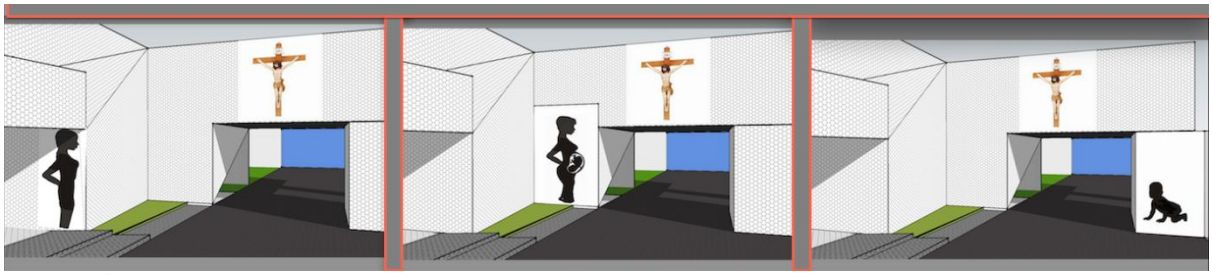
Thanks.

Yours faithfully,

Mr. Jonah Francis
Proprietor and Director of Studies
Jofrance Model School

A school with Vision and Focus

Religious Symbolism Treatment



1. Pre-life Image
2. In utero image
3. Baby image

Secular Symbolism Treatment

1. Pre-life Image
2. In utero image
3. Baby image

List of Questions

Table 1. Retrograde immortality questions

Question category	Questions
Biological	Could your eyes work? Could your heart beat?
Psychobiological	Could you be thirsty? Could you be hungry?
Perceptual	Could you watch something? Could you listen to something?
Epistemic	Could you think things? Could you remember things?
Emotional	Could you feel sad? Could you feel happy?
Desire	Could you want anything? Could you desire anything?

Note: All 12 questions will be prefaced the following way: "Think about yourself during this time when your mother still was not pregnant with you. During that time (e.g., Could your eyes work?)".

INFORMATION SHEET

Reasoning by Analogy in Nigerian School Children.

The Department of Psychology at Brunel University requires that all persons who participate in psychology studies give their written consent to do so.

The participant freely and voluntarily consents to participate in the research project entitled "Reasoning by analogy in Nigerian School Children" to be conducted with Mark Iruayenama from Brunel University as principal investigator. The broad goal of this research program is to explore children's perception of the enduring qualities of personhood and the questions to be put forward to them assesses how they conceptualise events in their past. Specifically, children will be asked a series of 12 questions requiring yes-no answers after the context of the questions have been explained to them with the aid of pictures. The session should take no longer than 15 minutes per participant to complete.

All responses will be kept strictly confidential. At any time during the session if the participant feels unable or unwilling to continue, the participant is free to leave without negative consequences. That is, participation in this study is completely voluntary. Withdrawal would not result in any penalty, academic or otherwise. No name will be linked with the research materials, as the researchers are interested in the perception of personhood in general, not any individual's responses in particular. Participants will be given the opportunity to ask questions regarding the procedure, and all questions must be answered to the participant's satisfaction.

If the participant has any general questions about this project, or ethical issues relating to the project, the participant should feel free to contact Mark Iruayenama at Mark.Iruayenama@brunel.ac.uk. If the participant has any concerns or complaints regarding the way in which the research is or has been conducted the participant may contact the Chair of the Psychology Research Ethics Committee Dr Achim Schuetzwohl at achim.schuetzwohl@brunel.ac.uk or the co-convener Dr Bridget Dibb at bridget.dibb@brunel.ac.uk

PARENT'S CONSENT FORM

Reasoning by Analogy in Nigerian School Children

Please note, as it says on the information sheet provided to you, you are free to withdraw your child / children from the study with no negative consequences academic or otherwise. That is, your child will not be affected if you refuse (or if your child refuses) to participate.

	YES	NO
1. I have read the Research Participant Information Sheet (on behalf of my child).		
2. I have had an opportunity to ask questions and discuss this study.		
3. I understand that my child is free to withdraw from the study:		
– at any time (Please note that your child will be unable to withdraw once the data has been included in any reports, publications etc.)		
– without having to give a reason for withdrawing		
4. I understand that my child will not referred to by name in any report/publications resulting from this study		
5. I understand that my child's school work/marks etc. will not be affected should my child decide not to participate		
6. My child agrees to take part in this study		

Parent's name:
Parent's signature:
Date:
PRINCIPAL INVESTIGATOR NAME:
PRINCIPAL INVESTIGATOR SIGNATURE:
DATE:

One copy to be kept by the parent and one by the researcher

CHILDREN'S CONSENT FORM

Reasoning by Analogy in Nigerian School Children

	YES	NO
1. I have read the Research Participant Information Sheet		
2. I have had the chance to ask questions and talk about this study.		
3. I understand that I am free to refuse to take part		
– at any time (Please note that you can't collect back you information after it has been used in reports, publications etc.)		
– without giving a reason		
4. I understand that I will not be called by name when the study is reported		
5. I understand that my school work/marks etc. will not be affected if I refuse to take part		
6. I agree to take part in this study		

Participant's Name:
Participant's signature:
Date:

PRINCIPAL INVESTIGATOR NAME:
PRINCIPAL INVESTIGATOR SIGNATURE:
DATE:

One copy to be kept by the participant and one by the researcher

DEBRIEF FORM

Reasoning by Analogy in Nigerian School Children

I would like to take this opportunity to say **Thank You** for taking the time to respond to the questions.

Please be assured, all data collected will be treated in the strictest confidence. You are free to withdraw your data from the research at any time by contacting Mark Iruayenama Mark.Iruayenama@brunel.ac.uk or Dr Michael Price at michael.price@brunel.ac.uk

The completed research will help to gain an understanding of children's conceptualization of the continuity of personhood generally and conceptualization of retrograde immortality specifically. You were chosen to take part in the study because you fall between the ages of five and twelve.

If you were unduly or unexpectedly affected by taking part in the study please feel free to feed it back to the researcher. If you feel unable for whatever reason what-so-ever to talk with the researcher then please either contact Dr Michael Price at michael.price@brunel.ac.uk or the ethics officers Achim.Schuetzwohl@brunel.ac.uk, 01895 266367 and bridget.dibb@brunel.ac.uk, 018952 66564.

SCHOOL OF SOCIAL SCIENCES ETHICS CHECKLIST

ETHICAL MATTERS MUST BE CONSIDERED BEFORE ANY RESEARCH TAKES PLACE

FAILURE TO FOLLOW THE CORRECT ETHICAL PROCEDURESOR CONDUCTING RESEARCH WITHOUT ETHICAL APPROVAL WHERE IT IS REQUIRED MAYLEAD TO DISCIPLINARY ACTION

GUIDANCE

This Ethics Checklist has been designed to help determine the level of risk or harm to participants' welfare entailed in a proposed study. It also contains a sample consent form and information leaflet checklist that you can use/adapt as appropriate.

NB: If your research requires NHS ethics approval, you should not complete this form. Please provide the School with a copy of your letter of NHS approval once you receive this.

Who Completes the Checklist?

The Principal Investigator (PI) is the main researcher and can be a student. The PI (or where the PI is a student, the supervisor) is responsible for exercising appropriate professional judgement in this review.

Underpinning Codes of Ethics

Before completing this checklist, you must refer to the University Code of Research Ethics as well as the relevant code of ethics for your discipline. These are listed in the Useful Links section at the end of this guidance. It is your responsibility to follow these Codes of Research Ethics in the conduct of your study. This includes providing appropriate documentation and ensuring confidentiality in the storage and use of data (see section 3.3.2 of the University Code of Research Ethics).

The Checklist

This Checklist is in two parts:

Part 1: This must be completed by all students and staff undertaking research. This section aims to confirm that there are no ethical or risk assessment issues related to your research.

Part 2: This is for all Principal Investigators who identify that there are ethical and/or risk assessment issues in their proposed research.

YOU MUST HAVE YOUR APPLICATION, CONSENT FORM AND INFORMATION SHEET APPROVED BY YOUR DEPARTMENTAL ETHICS COORDINATOR (OR IF APPROPRIATE, UNIVERSITY ETHICS COMMITTEE) BEFORE YOU START YOUR RESEARCH AND APPROACH POTENTIAL PARTICIPANTS.

What do I have to do if I need to complete the University Research Ethics Committee

Application Form?

You will need to complete and submit this via BBL. In most cases, the School will be able to review and approve the ethics form. If the research needs University level approval, your form will be submitted to the University Research Ethics Committee by the Research Office.

Risk Assessment

All Principal Investigators (and their supervisor where relevant) are required to consider matters of risk and conduct a risk assessment as part of the University's Health and Safety Policy. If issues of riskare identified, a risk assessment is required and must be attached to this form. For further information about Risk Assessments and guidance on how to undertake one, see the document 'RISK ASSESSMENT – FAQs' which can be found in in the School of Social Sciences Ethics Organisation, under my Organisations in BBL.

Disclosure and Barring Service (formerly Criminal Record Bureau)Checks

If your research involves vulnerable persons, you are required to follow University guidelines for Disclosure and Barring Service (DBS) checks. If you need a DBS check please contact the DBS Administrator in Admissions who will send you the information you need to make a DBS application.

How to submit Checklist and appendices on Blackboard Learn

Stage 1: Log into BBL

Stage 2: Click on the School of Social Sciences Research Ethics Organisation, under the My Organisations list on the right hand side

Stage 3: Download the Ethics Checklist from the folder on the homepage titled 'Research Ethics Application Form'.

Stage 3: Click on your appropriate department folder

Stage 4: Click on the Ethics Checklist Submission Assignment Tool

Stage 5: Upload your Ethics Checklist and appendices eg consent form, information leaflet, using the Browse My Computer link, and ensure you have uploaded the correct documents

Stage 6: Once you have confirmed they are the correct documents, click submit

Stage 7: You will receive an email receipt of your submission to your Brunel email account

Stage 8: Click on the My Grades link in the School of Social Sciences Research Ethics Organisation to find the outcome and feedback once it has been reviewed by your Departmental Ethics Coordinator.

Further information about how to submit is available in the School of Social Sciences Ethics Organisation, under My Organisations, in BBL.

What happens after I have received ethical approval?

Once you have received ethical approval, you can start your research.

Students are required to retain a copy of the approved Checklist, consent form and information leaflet and submit these with their research report/dissertation/thesis.

All undergraduate and postgraduate work submitted/conducted without ethical approval may be subject to academic penalties and disciplinary action.

If your research is delayed and will extend beyond the dates stated on your form, please contact your Departmental Ethics Coordinator to seek approval for an extension.

Useful Links and Resources

University Research Code of Ethics LINK

UREC website - LINK

Code of Ethics – Anthropology LINK

Code of Ethics – Economics and Finance (Use University Research Code of Ethics)

Code of Ethics – Politics and History (Use University Research Code of Ethics)

Code of Human Research Ethics – Psychology PDF

Code of Ethics – Sociology and Communications - LINK

Risk Assessment – FAQs – School of Social Sciences Ethics Organisation, under my Organisations in BBL.

Contacts

Anthropology Ethics Coordinator:	Dr Isak Niehaus
Economics and Finance Ethics Coordinator:	Professor Frank Skinner
Politics and History Ethics Coordinator:	Dr John MacMillan
Psychology Ethics Coordinator:	Dr Achim Schutzwohl/ Dr Bridget Dibb
Sociology and Communications Ethics Coordinator:	Dr Simon Weaver
RESEARCH ETHICS ADMINISTRATOR:	MS AMREEN MALIK

SSS RESEARCH ETHICS REVIEW CHECKLIST – PART 1

SECTION I: PROJECT DETAILS

1. Project title: **Reasoning by Analogy: Inference of Retrograde Immortality by Priming Future Immortality in Nigerian School Children.**	
2. Proposed start date: 12/10/14	3. Proposed end date: 12/10/15

SECTION II: APPLICANT DETAILS

4. Name of researcher (applicant)	Mark Abiye Iruayenama
5. Student Number	1137686
6. Status	PGR Student
7. Department	Psychology
8. Brunel e-mail address	Mark.Iruayenama@brunel.ac.uk
9. Telephone number	07949954405

SECTION III: FOR STUDENTS ONLY

10. Module name and number:	Psychology Research PhD
11. Supervisor's name:	Dr Michael E. Price
12. Brunel supervisor's e-mail address:	michael.price@brunel.ac.uk

	Yes	No
13. Does this research involve human participants?	◉	○
14. Does this research raise any ethical or risk concerns as set out in the University Code of Research Ethics or relevant disciplinary code?	○	◉
15. Risk Assessment – are there any elements of risk related to the proposed research? (See Risk Assessment – FAQs)	○	◉

If you have answered **Yes** toany of questions 13-15, you must**complete Part 2** of this form.

Students: If you have answered No, please email this document to your supervisor who will confirm that the research does not involve ethical issues. Once electronically signed by your supervisor, please submit Part 1 of this form via BBL within 1 week. Please keep a copy for yourselfand bind itinto your dissertation/thesis as an appendix.

Staff: If you have answered No, please sign below and submit your form via BBL. Please keep a copy for yourself.

If your research methodology changes significantly, you must submit a new form.

For Supervisor's/Staff e-signature

I confirm that there are no ethical or risk issues relating to this research and the applicant can proceed with the proposed research.
e-signature/ Date: Michael Price, 16/10/14

SSS RESEARCH ETHICS REVIEW CHECKLIST – PART 2

Section IV: Description of project

Please provide a short description of your project:
Children (5 yrs – 12 yrs) will be tested in an unoccupied classroom individually, within their school premises uder the supervision of their class teacher. They will be introduced to the study by telling them that they will be asked questions about the past and things they could do then. The experimenter will inform the children that the questions will not be graded, and are not part of a test. Children will be presented with three drawings representing three developmental periods in their past (Emmons & Kelemen, 2014). The images consist of culturally appropriate renditions of a Nigerian woman and infant (see Appendix II). The three images include: a pre-life image (depiction of a young mother), an in utero image (depiction of a pregnant mother), and a baby period image (depiction of a baby). The images will be presented to the children following the procedure set out by Emmons and Kelemen (2014). Crucially, and novel to the present study, two sets of images will be presented to the children; one containing religious symbolism and another containing secular symbolism (see Appendix III).

According to experimental condition (religious symbolism vs. secular symbolism), all three images will be initially laid out on the table linearly (i.e., prelife period, in utero fetal period, and baby period). Children will be told to imagine the drawings are of themselves and their mother. The baby period will be discussed first (while pointing to the drawing of the baby), followed by the in utero fetal period (explaining that that they were in their mother's belly), and lastly the pre-life period (explaining that it was before they were born). After the introduction of the drawings, they (the drawings) will be mixed up and the children will be asked to order them linearly to ascertain if they understand that the drawings represent three distinct stages of their past. If any child fails to order the images correctly the order of the images will be reviewed and the child will be given a second chance to answer.

When the three different drawings have been understood by the child, the pre-life image alone (religious symbolism vs. no symbolism) will be laid down on the table and the child will be asked 12 "yes-no" questions about mental and bodily functions they might have had during their pre-life period. (See Appendix IV for the list of questions). All 12 questions will be prefaced the following way: "Think about yourself during this time when your mother still was not pregnant with you. During that time (Could you feel happy?)".

SECTION V: RESEARCH CHECKLIST

Please answer each question by ticking the appropriate box:

	YES	NO
1. Does the project involve participants who are particularly vulnerable or unable to give informed consent (e.g. children/ young people under 18, people with learning disabilities, your own students)?	◉	○
2. Will the research involve people who could be deemed in any way to be vulnerable by virtue of their status within particular institutional settings (e.g., students at school, residents of nursing home, prison or other institution where individuals cannot come and go freely)?	◉	○
3. Will it be necessary for participants to take part in the study without their knowledge and consent (e.g., covert observation of people in non-public places)?	○	◉
4. Will the study involve discussion of sensitive topics (e.g., sexual activity, drug use) where participants have not given prior consent to this?	○	◉

	YES	NO
5. Will the study involve work with participants engaged in breaking the law?	○	◉
6. Will the publications/reports resulting from the study identify participants by name or in any other way that may identify them, bring them to the attention of the authorities, or any other persons, group or faction?	○	◉
7. Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	○	◉
8. Will the study involve the use of human tissue or other human biological material?	○	◉
9. Will blood or tissue samples be obtained from participants?	○	◉
10. Is pain or more than mild discomfort likely to result from the study?	○	◉
11. Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	○	◉
12. Will the study involve prolonged or repetitive testing?	○	◉
13. Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	○	◉

	YES	NO
14. Will the study require the co-operation of another individual/ organisation for initial access to the groups or individuals to be recruited? If yes please attach the letters of permission from them.	◉	○
15. Will you be undertaking this research as part of a work placement or in conjunction with an external organisation? If Yes and the organisation has conducted its own research ethics review, please attach the ethical approval.	○	◉

If you have answered 'yes' to any of questions 1-13, you will need to complete the University Application Form for Research Ethics Approval.

Students: If you have answered 'No' to all of questions1-13, please**sign below and submit this completed Checklist, consent form, information leaflet and any other documents and attachments for your supervisor's approval by email .Once you have received it back from your supervisor you will be able to submit via BBL. Forms that do not have your supervisor's approval will be rejected.**

Staff: If you have answered 'No' to all of questions 1-13, please **sign below and submit this completed Checklist, consent form, information sheet and any other documents and attachments via BBL.**

Please note that it is your responsibility to follow the University's Code of Research Ethics and any relevant academic or professional guidelines in the conduct of your study. **This includes providing appropriate information sheets and consent forms, and ensuring confidentiality in the storage and use of data.** Any significant change in protocol over the course of the research should be notified to the Departmental Ethics Coordinator and may require a new application for ethics approval.

Applicant (Principal Investigator) Name: Mark Iruayenama
Applicant's e-signature: MAI
Date: 16/10/14

Supervisor Section (for students only)

Please tick the appropriate boxes. The study should not be submitted until all boxes are ticked:

☒	The student has read the University's Code of Research Ethics
☒	The topic merits further research
☒	The student has the skills to carry out the research
☒	The consent form is appropriate
☒	The participant information leaflet is appropriate
☒	The procedures for recruitment and obtaining informed consent are appropriate
☐	An initial risk assessment has been completed
☐	If there are issues of risk in the research, a full risk assessment has been undertaken in line with the 'School of Social Sciences Risk Assessment– FAQs' document and a risk assessment is attached.
☐	A DBS check has been obtained (where appropriate)
☒	The debriefing form is appropriate (NB for psychology only- please refer to BBL)

Any comments from supervisor:

Supervisor or module leader (where appropriate):
E-signature: Michael Price
Date: 16/10/14

Supervisors: Please **email** this form to the student who will then need to submit it and

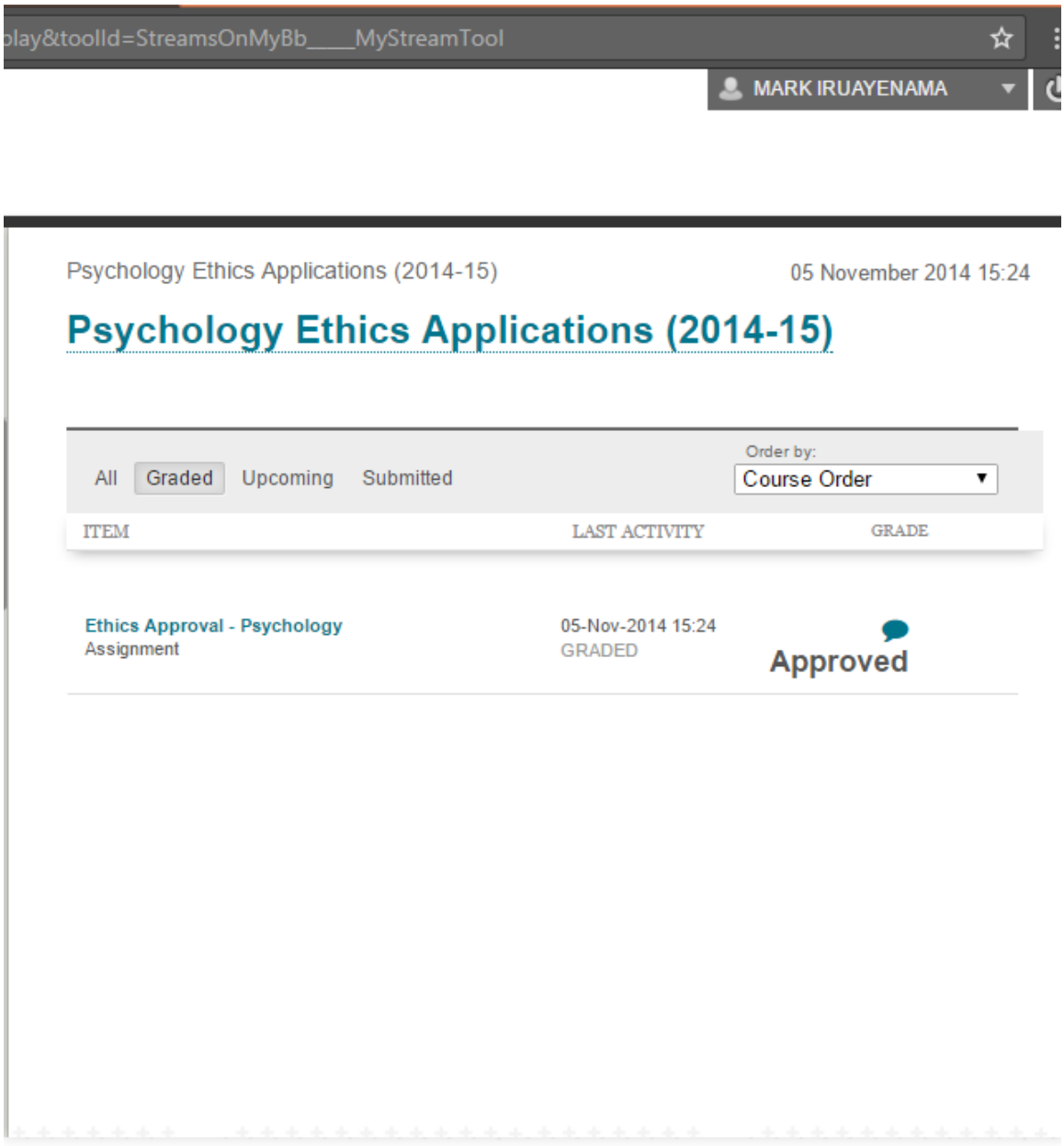
related appendices via BBL.

Student: Once you have received this form back from your supervisor, submit this completed Checklist, consent form, information sheet and any other documents and attachments via BBL.

Departmental Ethics Coordinator section:

This request for expedited review has been:	☐ Approved (No additional ethics form is necessary)
	☐ Declined (Full University Ethics Form is necessary)
	☐ Declined (Please give reason below)

Departmental Ethics Coordinator Name:
E- signature
Date:


play&toolId=StreamsOnMyBb____MyStreamTool
MARK IRUAYENAMA
Psychology Ethics Applications (2014-15)
05 November 2014 15:24
Psychology Ethics Applications (2014-15)
All
Graded
Upcoming
Submitted
Order by:
Course Order
ITEM
LAST ACTIVITY
GRADE
Ethics Approval - Psychology
Assignment
05-Nov-2014 15:24
GRADED
Approved

VI

Study Five: Information Sheet

Memory Retention and Other Psychological Constructs

You are invited to participate in a psychology study interested in memory retention and other psychological constructs. The Department of Psychology at Brunel University requires that all persons who participate in psychology studies give their written consent to do so.

The broad goal of this research program is to explore participants' ability to recall items encoded in memory in a dynamic context. A second and separate study assesses a number of general psychological constructs.

You are not obligated to participate in this study and if at any time during the session you feel unable or unwilling to continue, you are free to leave without negative consequences.

You will be required to perform a counting task and respond to a series of questionnaires not related to the counting task. The sequence of presentation (counting task first or not) will vary and depends on random allocation.

There are disadvantages to taking part in this research. All your responses will be kept strictly confidential. Your name will never be linked with the research materials, as the research does not focus on any individual's response but the general scores of all the responses.

If you have any general questions about this project, or ethical issues relating to the project, feel free to contact Mark Iruayenama at Mark.Iruayenama@brunel.ac.uk. If you have any concerns or complaints regarding the way in which the research is or has been conducted you may contact the Chair of the Psychology Research Ethics Committee Dr Achim Schuetzwohl at achim.schuetzwohl@brunel.ac.uk.

VII

Study Five: Consent form

	YES	NO
1. **I have read the Research Participant Information Sheet.**	☐	☐
2. **I have had an opportunity to ask questions and discuss this study.**	☐	☐
3. **I understand that I am free to withdraw from the study:**		
- at any time (Please note that you will unable to withdraw once your data has been included in any reports, publications etc.)	☐	☐
- without having to give a reason for withdrawing	☐	☐
4. **I understand that I will not be referred to by name in any report/publications resulting from this study**	☐	☐
5. **I agree to take part in this study**	☐	☐

Research Participant Name:
Research Participant signature:
Date:

Principal Investigator name:
Principal Investigator signature:
Date:

One copy to be kept by the participant and one by the researcher

VIII

Study Five: Debriefing form

The study aims to investigate how specific culturally acquired constructs stored in memory and associated with specific cultural visual symbolism (religious and sceptic) might influence self-reported measures on need for cognitive closure, agency detection, positive schizotypy, and religiosity. Depending on a random selection process you would have viewed during the counting task either a category of religious symbolism, scepticism symbolism, or no symbolism.

The general hypothesis of the study, informed by the attentional sensitization of unconscious visual processing theory (Kiefer & Adams, 2012), is that exposure to relevant symbolism will amplify task-congruent pathways associated with the particular symbol, given that these pathways are already established in memory. (i.e., exposure to scepticism symbolism will result in more rumination and doubt when responding to the questionnaires).

The following studies might be of interest to you:

Barrett, J.L. & Johnson, A.H. (2003).The role of control in attributing intentional agency to inanimate objects.*Journal of Cognition and Culture*, **3**(3): p. 208-217.

Kiefer, M., Adams, C,S, & Zovko, M. (2012). Attentional sensitization of unconscious visual processing: Top-down influences on masked priming.*Adv Cogn Psychol*. 8(1): 50–61.

Scholl, B.J. & Tremoulet, P.D. (2000).Perceptual causality and animacy.*Trends in Cognitive Sciences.*4(8): p. 299-309.

Wyer, R. Jr. (Ed) (1997). The Automaticity of Everyday Life: Advances in Social Cognition in Social Cognition, Volume 10. New York: Psychology Press

Once again, thank you for taking part in this study.

IX

Study Five: Ethics Checklist / Approval

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School of Social Sciences Ethics Checklist

ETHICAL MATTERS MUST BE CONSIDERED BEFORE ANY RESEARCH TAKES PLACE
FAILURE TO FOLLOW THE CORRECT ETHICAL PROCEDURES OR CONDUCTING RESEARCH WITHOUT ETHICAL APPROVAL WHERE IT IS REQUIRED MAY LEAD TO DISCIPLINARY ACTION

Guidance

This Ethics Checklist has been designed to help determine the level of risk or harm to participants' welfare entailed in a proposed study. It also contains a sample consent form and information leaflet checklist that you can use/adapt as appropriate.

NB: If your research requires NHS ethics approval, you should not complete this form. Please provide the School with a copy of your letter of NHS approval once you receive this.

Who Completes the Checklist?

The Principal Investigator (PI) is the main researcher and can be a student. The PI (or where the PI is a student, the supervisor) is responsible for exercising appropriate professional judgement in this review.

Underpinning Codes of Ethics

Before completing this checklist, you must refer to the University Code of Research Ethics as well as the relevant code of ethics for your discipline. These are listed in the Useful Links section at the end of this guidance. It is your responsibility to follow these Codes of Research Ethics in the conduct of your study. This includes providing appropriate documentation and ensuring confidentiality in the storage and use of data (see section 3.3.2 of the University Code of Research Ethics).

The Checklist

This Checklist is in two parts:

Part 1: This must be completed by all students and staff undertaking research. This section aims to confirm that there are no ethical or risk assessment issues related to your research.

Part 2: This is for all Principal Investigators who identify that there are ethical and/or risk assessment issues in their proposed research.

YOU MUST HAVE YOUR APPLICATION, CONSENT FORM AND INFORMATION SHEET APPROVED BY YOUR DEPARTMENTAL ETHICS COORDINATOR (OR IF APPROPRIATE, UNIVERSITY ETHICS COMMITTEE) BEFORE YOU START YOUR RESEARCH AND APPROACH POTENTIAL PARTICIPANTS.

What do I have to do if I need to complete the University Research Ethics Committee Application Form?

You will need to complete and submit this via BBL. In most cases, the School will be able to review and approve the ethics form. If the research needs University level approval, your form will be submitted to the University Research Ethics Committee by the Research Office.

Risk Assessment

All Principal Investigators (and their supervisor where relevant) are required to consider matters of risk and conduct a risk assessment as part of the University's Health and Safety Policy. If issues of risk are identified, a risk assessment is required and must be attached to this form. For further information about Risk Assessments and guidance on how to undertake one, see the document 'RISK ASSESSMENT – FAQs' which can be found in in the School of Social Sciences Ethics Organisation, under my Organisations in BBL.

Disclosure and Barring Service (formerly Criminal Record Bureau) Checks

If your research involves vulnerable persons, you are required to follow University guidelines for Disclosure and Barring Service (DBS) checks. If you need a DBS check please contact the DBS Administrator in Admissions who will send you the information you need to make a DBS application.

How to submit Checklist and appendices on Blackboard Learn

Stage 1: Log into BBL
Stage 2: Click on the School of Social Sciences Research Ethics Organisation, under the My Organisations list on the right hand side
Stage 3: Download the Ethics Checklist from the folder on the homepage titled 'Research Ethics Application Form'.
Stage 3: Click on your appropriate department folder
Stage 4: Click on the Ethics Checklist Submission Assignment Tool
Stage 5: Upload your Ethics Checklist and appendices eg consent form, information leaflet, using the Browse My Computer link, and ensure you have uploaded the correct documents
Stage 6: Once you have confirmed they are the correct documents, click submit
Stage 7: You will receive an email receipt of your submission to your Brunel email account
Stage 8: Click on the My Grades link in the School of Social Sciences Research Ethics Organisation to find the outcome and feedback once it has been reviewed by your Departmental Ethics Coordinator.

Further information about how to submit is available in the School of Social Sciences Ethics Organisation, under My Organisations, in BBL.

What happens after I have received ethical approval?

Once you have received ethical approval, you can start your research.

Students are required to retain a copy of the approved Checklist, consent form and information leaflet and submit these with their research report/dissertation/thesis.

All undergraduate and postgraduate work submitted/conducted without ethical approval may be subject to academic penalties and disciplinary action.

If your research is delayed and will extend beyond the dates stated on your form, please contact your Departmental Ethics Coordinator to seek approval for an extension.

Useful Links and Resources

University Research Code of Ethics LINK
UREC website - LINK
Code of Ethics – Anthropology LINK
Code of Ethics – Economics and Finance (Use University Research Code of Ethics)
Code of Ethics – Politics and History (Use University Research Code of Ethics)
Code of Human Research Ethics – Psychology PDF
Code of Ethics – Sociology and Communications - LINK

Risk Assessment – FAQs – School of Social Sciences Ethics Organisation, under my Organisations in BBL.

Contacts

Anthropology Ethics Coordinator:	Dr Isak Niehaus
Economics and Finance Ethics Coordinator:	Professor Frank Skinner
Politics and History Ethics Coordinator:	Dr John MacMillan
Psychology Ethics Coordinator:	Dr Achim Schutzwohl/ Dr Bridget Dibb
Sociology and Communications Ethics Coordinator:	Dr Simon Weaver
Research Ethics Administrator:	Ms Amreen Malik

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SSS Research Ethics Review Checklist – Part 1

Section I: Project details

1. Project title: Situational Influences of Cultural Symbols on Cognitive Closure, Positive Schizotypy, Agency Detection, and Religiosity	
2. Proposed start date: 07/08/2014	3. Proposed end date: 20/10/2015

Section II: Applicant details

4. Name of researcher (applicant)	Mark Abiye Iruayenama
5. Student Number	1137686
6. Status	PGR Student
7. Department	Psychology
8. Brunel e-mail address	Mark.Iruayenama@brunel.ac.uk
9. Telephone number	07949954405

Section III: For students only

10. Module name and number:	Psychology Research fieldwork data collection
11. Supervisor's name:	Dr Michael E. Price
12. Brunel supervisor's e-mail address:	michael.price@brunel.ac.uk

	Yes	No
13. Does this research involve human participants?	◉	○
14. Does this research raise any ethical or risk concerns as set out in the University Code of Research Ethics or relevant disciplinary code?	○	◉
15. Risk Assessment – are there any elements of risk related to the proposed research? (See Risk Assessment – FAQs)	○	◉

If you have answered **Yes** to any of questions 13-15, you must **complete Part 2** of this form.

Students: If you have answered No, please email this document to your supervisor who will confirm that the research does not involve ethical issues. Once electronically signed by your supervisor, please submit Part 1 of this form via BBL within 1 week. Please keep a copy for yourself and bind it into your dissertation/thesis as an appendix.

Staff: If you have answered No, please sign below and submit your form via BBL. Please keep a copy for yourself.

If your research methodology changes significantly, you must submit a new form.

For Supervisor's/Staff e- signature

I confirm that there are no ethical or risk issues relating to this research and the applicant can proceed with the proposed research.
e-signature/ Date: Michael Price, 25 July 2014

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SSS Research Ethics Review Checklist – Part 2

Section IV: Description of project

Please provide a short description of your project:
My research aims to investigate the situational influences of symbolism associated with specific culturally acquired constructs (benign and fearsome Christianity, and scepticism) on specific cognitive mechanisms (hyperactive agency detection device and need for cognitive closure), a specific personality trait (positive schizotypy) and self-reported religiosity (Religious fundamentalism and general religiosity). All research materials will be accessed online through SurveyMonkey. The experimental manipulation (exposure to symbols according to experimental treatment) will be carried out through asking participant to participate in a dual-n-back task. In the dual-n-back task, participants will view a virtual block of houses and count (1) how many flowers they spot by the windows of the houses according to the colour of the flower (red or yellow), (2) according to the spatial position of the windows (top window or bottom window), and (3) number of door bells that ring as the camera goes past the houses. While partaking in this task participants will be exposed to the symbols of interest, which would vary according to the experimental treatment that they randomly assigned to (benign Christian, fearsome Christian, scepticism, or no symbolism). The research will be carried out with two sets of participants. The first set will perform the dual-n-back task (according to experimental treatment) first before responding to the need for closure, agency detection, positive schizotypy and religiosity measures. This will enable an analysis of the influence of the symbols on each of these measures. The second set of participants will respond to the need for closure, agency detection, and positive schizotypy measures before performing the dual-n-back task (according to experimental treatment) and responding to the religiosity measures. This will (1) aim to replicate positive correlations between religiosity and each of the measures as demonstrated by previous studies and (2) assess if the scores on each of these measures will fail to predict religiosity after exposure to diametric situational influences. Please see the appendices four to eleven for links to the dual-n-back tasks, and full copies of the need for closure, positive schizotypy, agency detection, and religiosity measures to be used.

Section V: Research checklist

Please answer each question by ticking the appropriate box:

	YES	NO
1. Does the project involve participants who are particularly vulnerable or unable to give informed consent (e.g. children/ young people under 18, people with learning disabilities, your own students)?	○	◉
2. Will the research involve people who could be deemed in any way to be vulnerable by virtue of their status within particular institutional settings (e.g., students at school, residents of nursing home, prison or other institution where individuals cannot come and go freely)?	○	◉
3. Will it be necessary for participants to take part in the study without their knowledge and consent (e.g., covert observation of people in non-public places)?	○	◉
4. Will the study involve discussion of sensitive topics (e.g., sexual activity, drug use) where participants have not given prior consent to this?	○	◉

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	YES	NO
5. Will the study involve work with participants engaged in breaking the law?	○	◉
6. Will the publications/reports resulting from the study identify participants by name or in any other way that may identify them, bring them to the attention of the authorities, or any other persons, group or faction?	○	◉
7. Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	○	◉
8. Will the study involve the use of human tissue or other human biological material?	○	◉
9. Will blood or tissue samples be obtained from participants?	○	◉
10. Is pain or more than mild discomfort likely to result from the study?	○	◉
11. Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	○	◉
12. Will the study involve prolonged or repetitive testing?	○	◉
13. Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	○	◉

	YES	NO
14. Will the study require the co-operation of another individual/ organisation for initial access to the groups or individuals to be recruited? If yes please attach the letters of permission from them.	○	◉
15. Will you be undertaking this research as part of a work placement or in conjunction with an external organisation? If Yes and the organisation has conducted its own research ethics review, please attach the ethical approval.	○	◉

If you have answered 'yes' to any of questions 1-13, you will need to complete the University Application Form for Research Ethics Approval.

Students: If you have answered 'No' to all of questions 1-13, please **sign below and submit this completed Checklist, consent form, information leaflet and any other documents and attachments for your supervisor's approval by email . Once you have received it back from your supervisor you will be able to submit via BBL. Forms that do not have your supervisor's approval will be rejected.**

Staff: If you have answered 'No' to all of questions 1-13, please **sign below and submit this completed Checklist, consent form, information sheet and any other documents and attachments via BBL.**

Please note that it is your responsibility to follow the University's Code of Research Ethics and any relevant academic or professional guidelines in the conduct of your study. **This includes providing appropriate information sheets and consent forms, and ensuring confidentiality in the storage and use of data.** Any significant change in protocol over the course of the research should be notified to the Departmental Ethics Coordinator and may require a new application for ethics approval.

Applicant (Principal Investigator) Name: Mark Iruayenama
Applicant's e-signature: Iruayenama
Date:25/07/2014

Supervisor Section (for students only)

Please tick the appropriate boxes. The study should not be submitted until all boxes are ticked:

☑	The student has read the University's Code of Research Ethics
☑	The topic merits further research
☑	The student has the skills to carry out the research
☑	The consent form is appropriate
☑	The participant information leaflet is appropriate
☑	The procedures for recruitment and obtaining informed consent are appropriate
☐	An initial risk assessment has been completed
☐	If there are issues of risk in the research, a full risk assessment has been undertaken in line with the 'School of Social Sciences Risk Assessment– FAQs' document and a risk assessment is attached.
☐	A DBS check has been obtained (where appropriate)
☑	The debriefing form is appropriate (NB for psychology only - please refer to BBL)

Any comments from supervisor:

Supervisor or module leader (where appropriate):
E-signature: Michael Price
Date: 25 July 2014

Supervisors: Please **email** this form to the student who will then need to submit it and related appendices via BBL.

Student: Once you have received this form back from your supervisor, submit this completed Checklist, consent form, information sheet and any other documents and attachments via BBL.

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Departmental Ethics Coordinator section:

This request for expedited review has been:	X Approved (No additional ethics form is necessary)
	☐ Declined (Full University Ethics Form is necessary)
	☐ Declined (Please give reason below)

Departmental Ethics Coordinator Name: Achim Schuetzwohl
E- signature *Achim Schuetzwohl*
Date: 29/07/2014

Appendix D

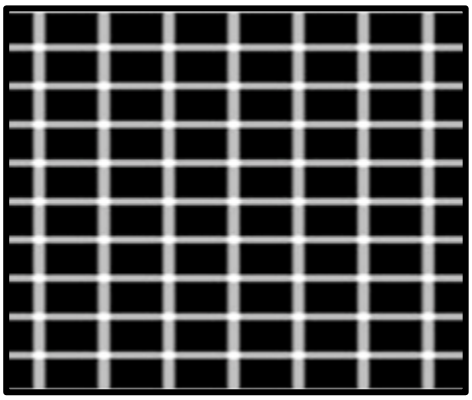
METHODOLOGY IMAGES

i

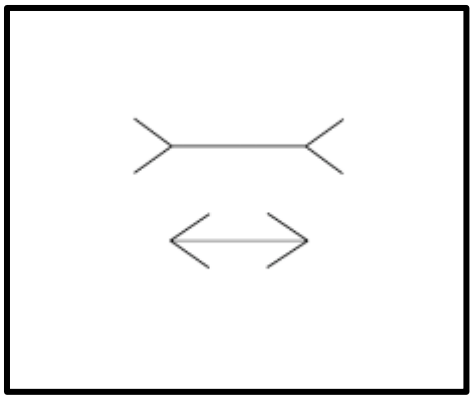
Study Two: Images for distraction task

1.

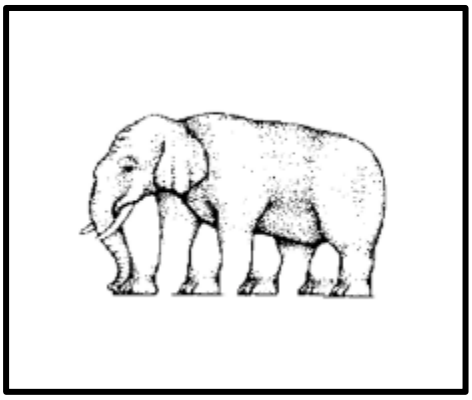
2.



3.



4.

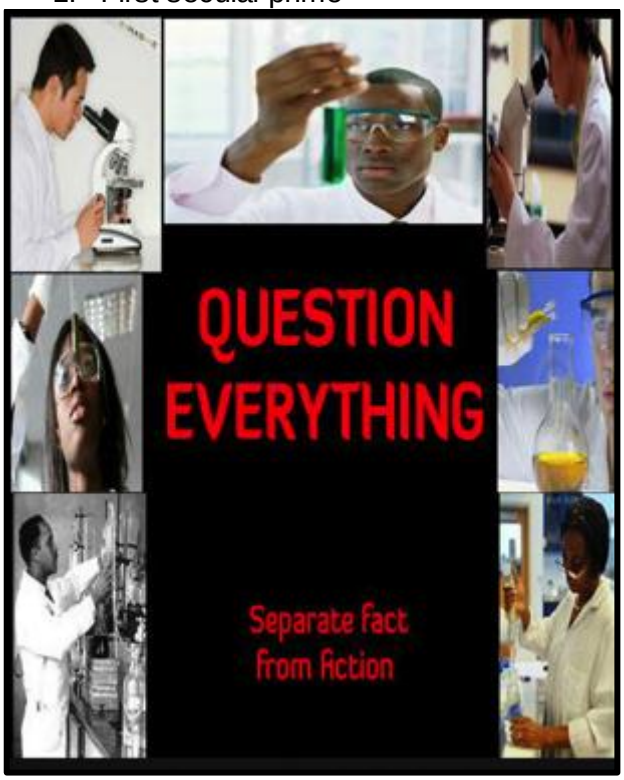


1. What can you see in the image? Can you join the dots to form a coherent image?
2. Can you see any circles between the black squares? If you can how many can you see?
3. Are the two straight lines (without the arrows at the end) equal?
4. How many legs does this elephant have?

II

Study Two: Secular primes

1. First secular prime

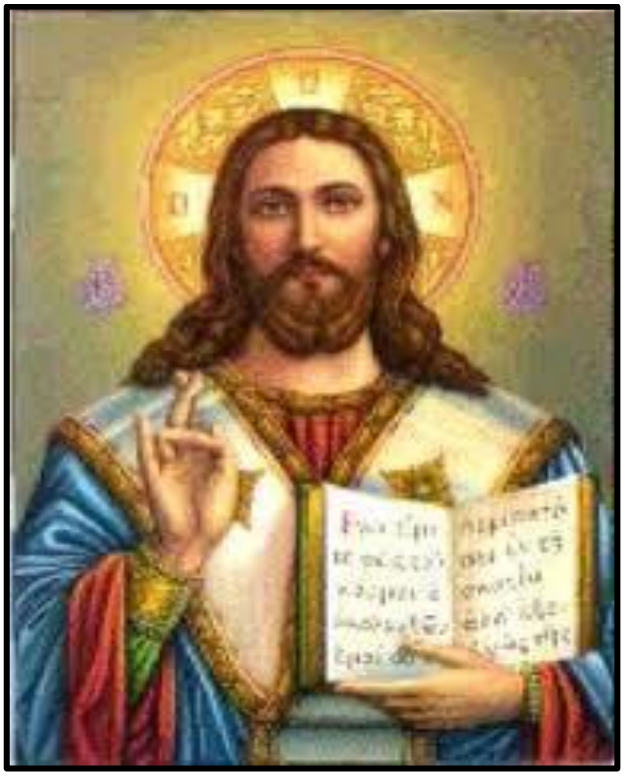


2. Second secular prime

III

Study Two: Benign Religious primes

1. First benign religious prime



2. First benign religious prime

IV

Study Two: Punitive Religious primes

1. First punitive religious prime

2. Second punitive religious prime

V

Study Three Secular primes

1. First secular prime

2. Second secular prime

VI

Study Three: Benign religious primes

1. First benign religious prime

2. Second benign religious prime

VII

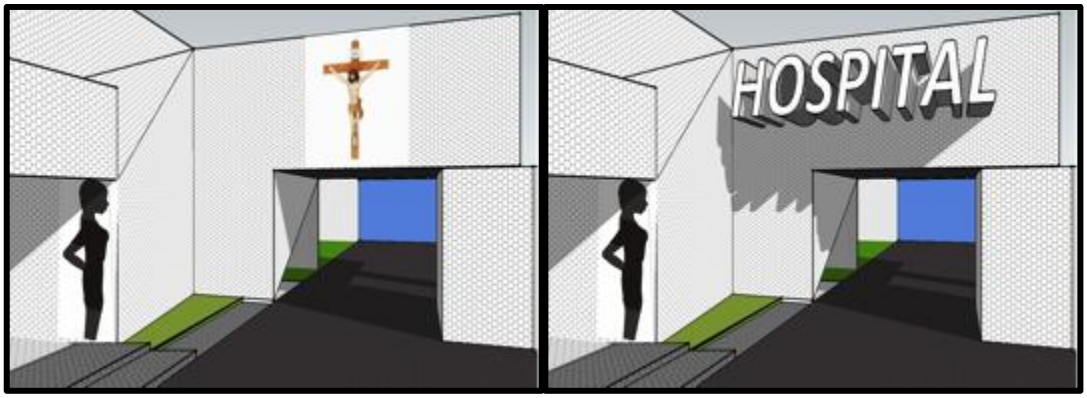
Study Three: Punitive religious primes

1. First punitive religious prime

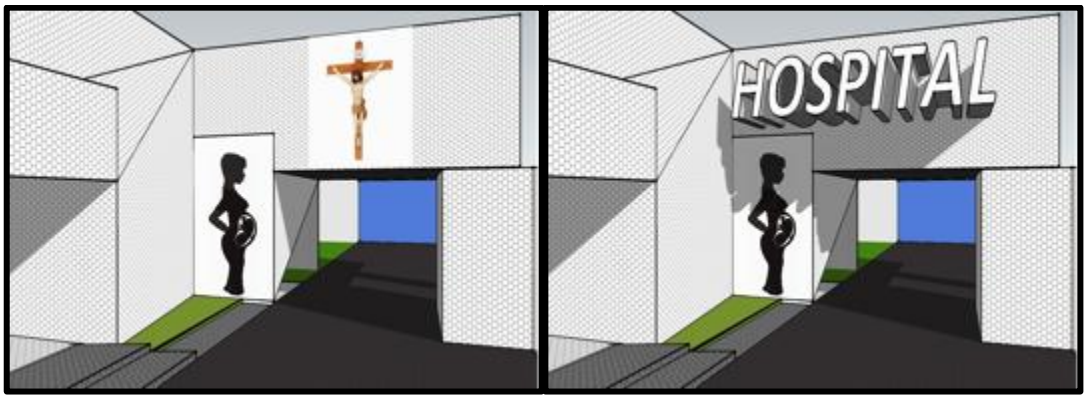
2. Second punitive religious prime

VIII

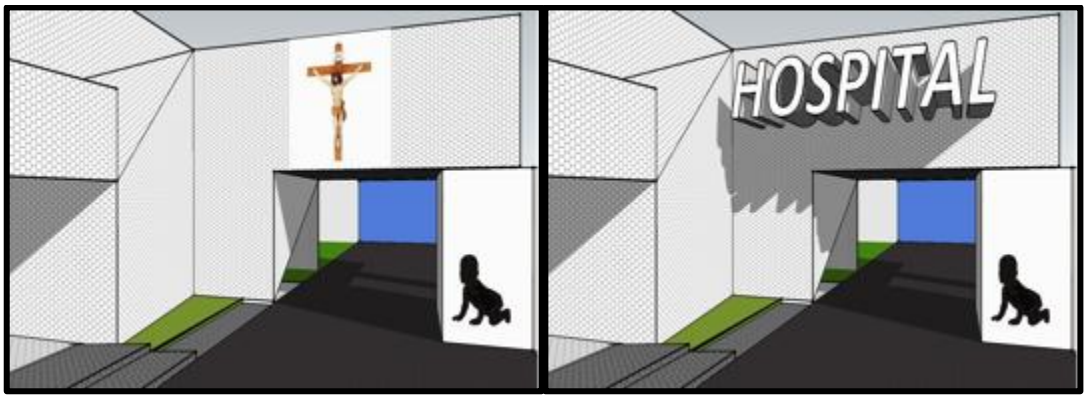
Study Four: Religious and non-religious primes



1. Pre-life period



2. In uteri period



2. Baby period

Religious prime

Non-religious prime

IX
Study Five: Still frame of secular video prime

1. Still frame of secular video prime

2. Still frame of secular video prime

X

Study Five: Still frame of secular video prime

1. Still frame of benign religious video prime

2. Still frame of benign religious video prime

XI

Study Three: Still frame of benign religious video prime

1. Still frame of punitive religious video prime

2. Still frame of punitive religious video prime

Appendix E

I

Studies Two and Three: Data collection

II

Study Four: Data collection

1. Religious treatment

2. Non-religious treatment

III

Study FIVE: Data collection

Appendix E

Examples of religious images in Nigeria

i

Sample image taken in Abuja

1. Large Christian billboard promoting the belief in eternity

II

Sample images taken in Lagos

1. Series of church adverts

2. Face of Jesus on a carrier bag

3. Threat of Hell inside a public bus

4. Christian flyer about Heaven and Hell

5. Christian stickers on a public bus

6. Christian messages inside a public toilet

7. Church building and signpost in a socioeconomic status area

8. Threat of Hell inside an academicvery lowinstitution (polytechnic)

APPENDIX G

BELIEF AND DISBELIEF IN THE BIBLE

I

Table 1

List of the Rewards for Belief in the Christian God in the Bible.

Chapter and Verse	Quote
Acts 16:31	"… believe on the Lord Jesus Christ, and thou shalt be saved, and thy house".
Acts 13:39	"And by him all that believe are justified from all things…"
Hebrews 11:6	"But without faith *it is* impossible to please *him*: for he that cometh to God must believe…"
James 2:19	"Thou believest that there is one God; thou doest well: the devils also believe and tremble".
John 3:16	"For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life".
John 5:24	"Verily, verily, I say unto you, He that heareth my word, and believeth on him that sent me, hath everlasting life, and shall not come into condemnation…".
John 6:35	"… he that cometh to me shall never hunger; and he that believeth on me shall never thirst".
John 6:47	"Verily, verily, I say unto you, He that believeth on me hath everlasting life".
John 11:25	"Jesus said unto her, I am the resurrection, and the life: he that believeth in me, though he were dead, yet shall he live".

(table continues)

Continued table

Chapter and Verse	Quote
John 11:40	Jesus saith unto her, Said I not unto thee, that, if thou wouldest believe, thou shouldest see the glory of God?"
John 20:29	"Jesus saith unto him, Thomas, because thou hast seen me, thou hast believed: blessed *are* they that have not seen, and *yet* have believed".
Luke 1:45	"And blessed *is* she that believed…"
Luke 8:50	"But when Jesus heard *it*, he answered him, saying, Fear not: believe only, and she shall be made whole".
Mark 9:23	"Jesus said unto him, if thou canst believe all things *are* possible to him that believeth".

II

Table 2

List of Consequences of Disbelief in the Christian God

Chapter and Verse	Quote
1 John 5:10	"… he that believeth not God hath made him a liar; because he believeth not the record that God gave of his Son".
2 Thessalonians 2:12	"That they all might be damned who believed not the truth, but had pleasure in unrighteousness".
2 Timothy 2:12	"… if we deny [him], he also will deny us:"
John 3:18	"He that believeth on him is not condemned: but he that believeth not is condemned already…"
John 3:36	"He that believeth on the Son hath everlasting life: and he that believeth not the Son shall not see life; but the wrath of God abideth on him".
John 8:24	"I said therefore unto you, that ye shall die in your sins: for if ye believe not that I am *he…"*
Jude 1:5	"I will therefore put you in remembrance, though ye once knew this, how that the Lord, having saved the people out of the land of Egypt, afterward destroyed them that believed not".

(table continues)

Continued table

Chapter and Verse	Quote
Luke 1:20	“And, behold, thou shalt be dumb, and not able to speak, until the day that these things shall be performed, because thou believest not my words, which shall be fulfilled in their season”.
Luke 12:46	“The lord of that servant will come in a day when he looketh not for him, and at an hour when he is not aware, and will cut him in sunder, and will appoint him his portion with the unbelievers”.
Hebrews 3:18 – 3:19	“And to whom sware he that they should not enter into his rest, but to them that believed not? 19 So we see that they could not enter in because of unbelief”.