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A Neuroscience Study on the Implicit Subconscious Perceptions of Fairness and Islamic Law in Muslims Using the EEG N400 Event Related Potential

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Ahmed Izzidien and Srivas Chennu

Abstract

We sought to compare the implicit and explicit views of a group of Muslim graduates on the fairness of Islamic law. In this preliminary investigation, we used the Electroencephalographic N400 Event Related Potential to detect the participant's implicit beliefs. It was found that the majority of participants, eight out of ten, implicitly held that Islamic Law was unfair despite explicitly stating the opposite. In seeking to understand what separated these eight participants from the remaining two – the two who both implicitly and explicitly held that Islamic Law was fair – only two distinguishing characteristics could be identified. Both participants had undertaken an in-depth study of a branch of Islamic law that places the spirit of the law above that of a literal interpretation. They had also attended the same seminary, exclusive to the other participants. Of the eight participants, it was discovered that, while they implicitly held Islamic law to be unfair, they also held it to be rational – in the same way they found that it was rational to push a person off a ship in order to save the remaining from drowning, yet unfair. We discuss these preliminary findings and consider theories on how an innate sense of fairness, an aspect of nativism, may come into play when it is not congruent with a participant's own beliefs. Further, we ask, where such an inconsistency occurs, how does the mind attempt to rectify it – if at all? As a possible contribution to the discussion on theories of nativism vs. empiricism we put forward a hypothesis and methodology for investigation that may produce previously unconsidered data on human nature.

Keywords

Law, EEG, N400, Islam, Maqasid, Implicit, Values

Introduction

Children often question why things are the way they are. They also expect to be treated fairly amongst their peers. Such qualities, observed in infants from as young as six months, have spurred a theory that teleological reasoning and fairness are both innate (J. K. Hamlin 2015) (Deborah Kelemen and DiYanni 2005) challenging the empiricist notion that such qualities are learned. As infants progress through childhood and into adulthood, these qualities are seen to persist (Poling and Evans 2002) (Lombrozo, Kelemen, and Zaitchik 2007) (Deborah Kelemen, Rottman, and Seston 2013). It is such

that even with the most Machiavellian, seeing unfairness as justified for the gain of power, such unfairness is never wished upon themselves. An innate aversion to unfairness appears to persist.

Here we pose a question: what occurs implicitly within the mind of an individual who subscribes to an authority that defines its own version of fairness and purpose? For example, an individual may subscribe to a political ideology that sets policy that it then defines as fair and of service to a civic purpose. These policies may often be framed by the said authority as being beyond the rational grasp of the said individual and to be taken on trust despite any internal personal reservations. Another example may be that of a religious authority that defines its commands as fair and of purpose. Followers would be expected to accept such designations, even if they could not rationalise them. Thus, to consider how the mind of a person responds in this context, we sought to use the authority of 'Islam' defining its laws as 'fair and of purpose.' Using only Muslim participants for the study, the focus was on the authority of their religion defining the fairness and purpose of Islamic law. What their religion deemed to be fair and purposeful was to be accepted as fair and purposeful even if they could not rationalise such designations.

In order to measure the implicit response of the human mind towards such designations that are set by the authority to which they subscribe, we measured the implicit attitude of the individuals under investigation. This is because naturally occurring implicit attitudes have been found to be a more accurate measure of attitude than direct measures such as survey items with summated rating scales (Graham et al. 2012). Responses on direct measures such as surveys can represent conscious evaluations of content in memory rather than its activation (Gawronski, LeBel, and Peters 2007). Whereas many values, attitudes, and goals operate at implicit levels (Johnson and Saboe 2011) (Bargh and Chartrand 1999) (Greenwald and Banaji 1995), and often occur outside people's awareness, intention, and control (Wittenbrink and Schwarz 2007) (Johnson and Saboe 2011). Furthermore, there is increasing evidence that much affective and cognitive regulation occur automatically (Kanfer 2009), and while justice researchers often limit their attention to the explicit level, it is likely that justice has implicit effects because fairness-related experiences involve conditions of high arousal and strong affect (Tripp, Bies, and Aquino 2002) which increase the likelihood of implicit processing (Metcalf and Mischel 1999) (Johnson and Saboe 2011).

Ordinarily, observant Muslims would explicitly respond that 'Islamic law' was fair. The source texts of the religion often remind of a critical importance of justice and rational purpose behind law. However, for this investigation, we were wholly unaware of

the implicit attitudes of Muslims in this area as no such study has as yet been undertaken, particularly not from the perspective of the cognition of law and religion. Discussions around fairness, purpose, and authority in approaching Islamic source texts have to date often been based in philosophical and theological discourse with little perspective from the natural sciences.

A new assessment on how particular approaches to understanding Islamic law manifest in the mind may lead to new perspectives on how the mind responds to commands that do not necessary align with one's innate disposition. It may also help to inform how emerging Muslim majority counties in the world address this issue on a legal and constitutional level, particularly as fairness has been seen as a factor in bringing people together (Johnson and Lord 2010).

Furthermore, while studies have documented how fairness judgments in general affect policy positions, there has been relatively little done on the genesis of the fairness judgments themselves. Lind has proposed that justice perceptions are pivotal cognitions because they prime motivations that give rise to specific behaviors (2002, 67). Studies have also found substantial support for proposed links between the implicit effects of justice and self identity (Cropanzano et al. 2001).

Thus, detecting the attitudes of individuals towards law – with a commitment to a specific authority – may shed some light on how determinations of fairness and purpose in law may be pre-set in some individuals even before they evaluate cases of law, as will be discussed.

To assess why participants may hold the implicit attitudes that are contrary to their explicit attitudes, we also collected information on their religious education background and how they normally approached legal problems such as the trolley problem using an anonymous questionnaire. Being unaware of the implicit responses of Muslim participants to questions on the fairness and purpose of Islamic law, this being the first study of its kind as mentioned, we approached the study inductively. Then, using the data from the outcome, we formed two hypothesis for further study, one contingent on the implicit vs. explicit findings.

To measure implicit attitudes, we would use the EEG N400 event related potential (ERP) method. The method allows us to discern if a person's expressed explicit attitude is the same as their implicit attitude (Lind 2002) (Van Berkum et al. 2009) (Leuthold et al. 2015). For example, a study (Van Berkum et al. 2009) asked two groups of participants to consider the statements: (a) "I think euthanasia is an acceptable course of action;" and, (b) "I think euthanasia is an unacceptable course of action." For the twenty-one respondents the study describes as the strict Christian (SC) group, the authors compared

the Event Related Potential (ERP) responses to the value-inconsistent word 'acceptable' in the first sentence with ERP responses to the value-consistent word 'unacceptable' in the second sentence. For the twenty-one respondents of the non-Christian (NC) group, they compared ERPs across the same statements. They found that value-inconsistent sentences increased the amplitude of the N400 component (Van Berkum et al. 2009) a finding also observed in a study that examined the N400 for value-inconsistent sentences (Leuthold et al. 2015). The N400 response is a broad negative signal that appears around 400ms after the test word has been presented aurally or visually (Lau, Phillips, and Poeppel 2008). The system used has been further investigated by Wiswede who found the N400 marker can only be obtained when a participant uses an evaluative mindset (Wiswede et al. 2013). Thus, for this study we measured the ERP of Muslim participants when they considered the sentences 'I believe Islamic law is fair/unfair.'

Materials and Methods

Participants

Ethical approval from the University of Cambridge Psychology Research Ethics Committee was obtained for the study. As the study required the participation of committed and practicing Muslims, we advertised in the local Muslim Society and at two mosques in the Cambridge area. We also used social media and word of mouth. Those that registered their interest by emailing were sent a Participant Information Form and a Consent Form to consider before committing. Of the thirty-eight people who expressed interest, twenty-two registered and took part. Five were female and seventeen male. The age range was between twenty and twenty-nine, except one participant who was sixty-five. Due to artifacts, complete data from only ten participants, 9 male and 1 female, all between twenty and twenty-nine years of age, were usable in this study.

Stimuli

The software BCI2000 was used to present the sentences and record the EEG with accurate time-locking to the stimulus presentation. The choice of this software was due to exact time labeling of each stimulus cue on the EEG data, thus allowing for time locking and stimulus word identification during analysis without the concern of possible latency errors in labeling the EEG that may arise due to time delays when passing through long cables.

We presented the participants with sentences on a computer screen. The two test sentences were: 'I believe Islamic law is fair.' and 'I believe Islamic law is not fair.' Both were presented for counterbalancing. If the participant's implicit response to the first sentence was that they agreed, it was expected that the participant's implicit response to the second sentence would be that they disagreed.

These sentences were presented within a longer list of sentences that are not part of the study, but allowed for a distraction to avoid the participant anticipating the theme of the sentences. We also included a third test sentence 'Sharia is not irrational,' Sharia being a wider term for Islamic Law.

Control sentences acted as standards for the study. Four control sentences were presented to the participants:

- Malcolm X was a Prophet
- $7 + 1 = 4$
- A car has four wheels
- Mohammed was a Prophet

The first two control sentences were designed to be considered implicitly false by the participants, and the second two control sentences were designed to be considered implicitly true by the participants. The implicit responses to the control sentences were stored.

The implicit responses to a test sentence (e.g., 'I believe Islamic law is fair') could then be compared against the stored implicit responses elicited by the two controls. This allowed us to determine if the implicit response elicited by a test sentence belonged to the category of a 'true' or 'false' implicit control sentence response, as discussed in the Data Analysis section below.

All sentences were presented one word at a time. Each word appeared on a new slide. The slides had a black background, and used white text for contrast. To prepare the slides, JPEG images of each word were made. For each sentence, a blank black slide was inserted between each word to pace the participants equally, and to provide enough time for any impulse under 500ms to have dissipated. Each slide was visible for 500ms. The sentences were structured such that the final word in each sentence was the one that would elicit the implicit response. This response would depend on the reader's implicit attitude. Thus it was only the last word that was expected to generate an N400.

At the end of each sentence, where the N400 was due to be measured, two blank screens were presented to allow for enough time for the signal to be generated. The next slide displayed a question mark. Upon seeing the question mark, a participant, who would be sitting with their arms on the desk, would indicate their answer by tapping

the desk once for 'agree,' twice for 'disagree' and three times for 'unsure' – this would be their 'explicit response.' The act of tapping was found to elicit less interference to the EEG trace than asking them to verbally express their answer. A blank screen then separated the previous sentence from the next. Subjects sat facing a computer screen approximately 70 cm away in a noise-attenuated room to minimise distractions. The sentences were presented in the same order to the participants and were presented once. All participants were exposed to the same sentences.

The study was organized as part of an unpublished graduated MPhil dissertation at the University of Cambridge in a collaboration between the Faculty of Divinity and Department of Clinical Neurosciences.

Data Collection

The EEG of each participant was recorded using a g.tec USBamp (24-bit 16-channel biosignal amplifier, g.tec Medical Engineering GmbH, Austria. Serial Number UA-2007.04.24) at a sampling frequency of 256 Hz. The ground electrode was located on the right mastoid. The reference was selected as the electrode at AFz. Passive gold electrodes were placed on an EEG cap at sixteen recording sites distributed over central and parietal areas where the N400 is known to be maximal (FCz, Fz, F3, F4, Cz, C1, C2, C3, C4, Pz, P3, P4, O1, O2, PO3 and PO4). SuperVisc High Viscosity Electrolyte Gel (EasyCap GmbH, Germany) was used to improve conductivity between the scalp and the electrodes. The impedance values were kept under 25kOhm, and were typically 10k Ohms.

Data Analysis

The original reference was maintained. The EEG recorded was filtered using a digital FIR filter between 0.5Hz and 20Hz. This frequency range captured the N400 ERP. Periods with ocular artifacts in the EEG recordings were removed by visual inspection. The data were segmented into 1000-msec EEG epochs, starting 200-msec before the precise time of onset of the target word (the last word in each sentence) and ending 800-msec after the onset. The epochs were baseline corrected, using the average of the 200-msec pre-stimulus period.

The control sentence implicit response ERPs were averaged. A time window that provided the greatest distinction between the averaged 'false' control implicit responses of all the participants and that of averaged 'true' control implicit responses of all the participants was found. This was between the data points of 409ms – 503ms, on C2 (t-test 2.12, $p=0.003$). This provided for two control groups, an implicitly 'true' control

response, and its opposite, an implicitly 'false' control response. The EEGLAB toolbox for MATLAB (Delorme and Makeig 2004) was used for these analyses.

In order to be able to systematically categorise the implicit response of a participant to a test sentence (e.g., 'I believe Islamic law is fair') as being implicitly true or implicitly false, the implicit test sentence response was compared with implicit responses obtained from control sentences. This comparison was carried out as follows.

To determine which of the two control groups ('true' or 'false') an implicit response elicited by a test sentence belonged to, we employed a statistical comparison. We compared the implicit response elicited by a test sentence against the two control groups using a two-sample t-test. In order to determine if the implicit response elicited by a test sentence was the same or different to either of the two controls, we considered the p value that resulted when the t-test was conducted on the test sentence implicit response data points and each control implicit response data points. The t-test being made separately for each of the two controls against the implicit response elicited by a test sentence. We found that, for all results, the implicit response elicited by a test sentence could be attributed as being the same as either one of the two controls. The outcome of the t-test for each test sentence was a $p < 0.05$ for exclusively one of the two controls. Never were the data points elicited from a test sentence statistically the same as both controls. Each implicit response elicited by a test sentence could thus be categorised as belonging exclusively to either one of the two implicit control groups to a $p < 0.05$.

With all the test sentences now categorized as either implicitly true or implicitly false, we considered whether the implicit responses of the participants were in line with their explicit responses.

Results

Control Sentences

All twenty two participants were presented the four control sentences. To view the data from these, we present the full data set graph plot in Figures 1 & 2.

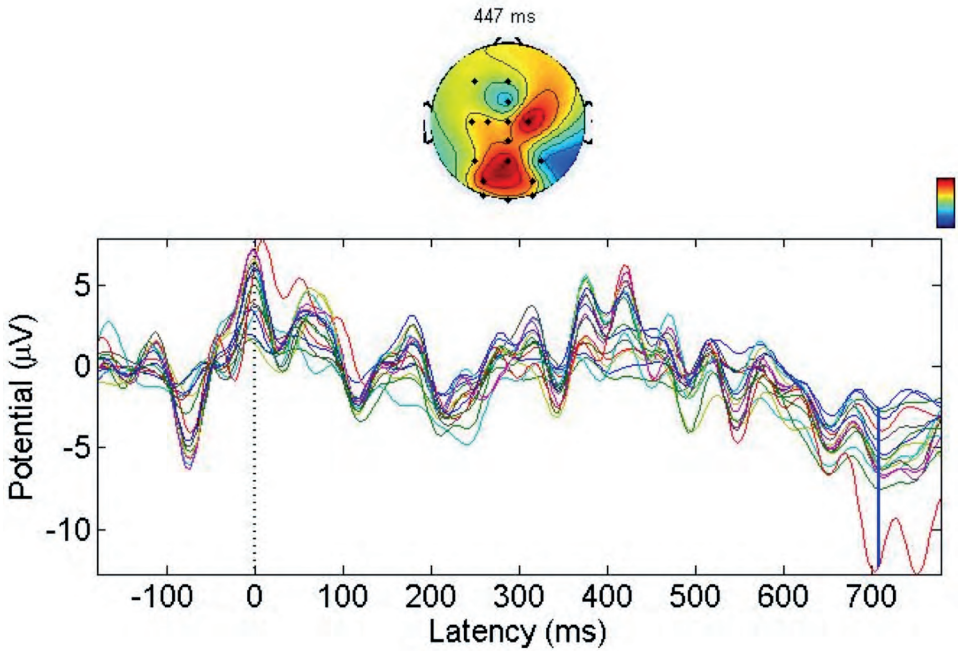


Figure 1. Average of all ERP signals from participants when they read the 'true' controls - sentences that they implicitly agreed with. The N400 wave is minimal (seen between 400ms to 500ms). Epoch from time (t) = -200ms to 800ms – whereby the final word of the control (stimulus onset) occurs at time (t) = 0ms. Each trace represents a channel.

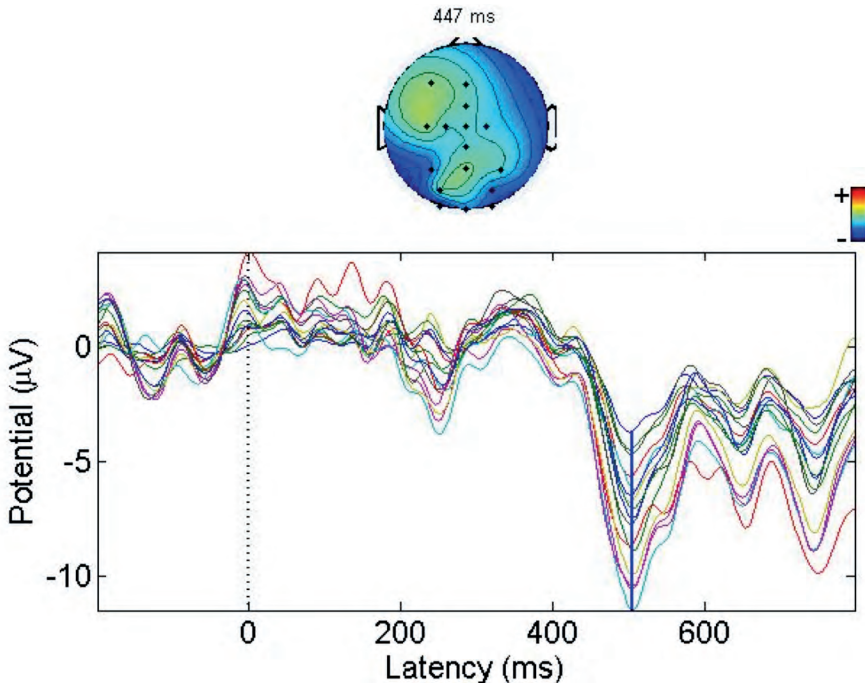


Figure 2. Average of all ERP signals from participants when reading 'false' controls - sentences they were implicitly disagreed with. The N400 wave is maximal (seen as the dip between 400ms to 500ms). Epoch from time (t) = -200ms to 800ms – whereby the final word of the control (stimulus onset) occurs at time (t) = 0.

Figure 1 depicts the responses to 'true' controls, and figure 2 depicts the 'false' control responses.

The results from asking participants whether they agreed or disagreed with the sentence 'I believe Islamic law is fair' is presented next. To visualize these outcomes, we present below the explicit response given by the participants, the implicit categorisation, the averaged implicit score (the ERP averaged over the 409ms – 503ms time window), and whether the implicit result was consistent with their explicit response.

Participant Number	Participant's Explicit Response to: 'I believe Islamic law is fair'	Participant's Implicit Response to: 'I believe Islamic law is fair'	Participant's avg. Implicit score (μV) to: 'I believe Islamic law is fair'	Comparison of Explicit and Implicit result
1	True	False	-2.9778	Inconsistent
2	True	True	0.3508	Consistent
3	True	False	-1.0719	Inconsistent
4	True	False	-5.1088	Inconsistent
5	True	False	-7.4296	Inconsistent
6	True	False	-57.5302	Inconsistent
7	True	False	-4.5338	Inconsistent
8	True	True	1.3363	Consistent
9	True	False	-41.005	Inconsistent
10	True	False	-7.0499	Inconsistent

Table 1. Explicit and implicit responses of all participants to the test sentence 'I believe Islamic law is fair.'

The test of the counterbalancing stimuli sentence 'I believe Islamic law is unfair' is given next.

Participant Number	Participant's Explicit Response to: 'I believe Islamic law is unfair'	Participant's Implicit Response to: 'I believe Islamic law is unfair'	Participant's avg. Implicit score (μV) to: 'I believe Islamic law is unfair'	Comparison of Explicit and Implicit result
1	False	True	9.8057	Inconsistent
2	False	False	0.8198	Consistent
3	False	True	1.1513	Inconsistent
4	False	True	0.7443	Inconsistent
5	False	True	2.0114	Inconsistent
6	False	False	-8.119	Consistent
7	False	False	-0.2034	Consistent
8	False	False	-4.658	Consistent
9	False	False	-3.7474	Consistent
10	False	False	-0.2928	Consistent

Table 2. Explicit and Implicit responses of all participants to the test sentence 'I believe Islamic law is unfair.'

The first result to appear in this determination was that, while all participants explicitly indicated that they agreed with the statement 'Islamic law is fair,' eight participants appeared to disagree implicitly. The two other participants displayed no inconsistency in their results. They explicitly and implicitly believed Islamic law was fair. They were participants 2 and 8. From their questionnaires, they both had attended the same seminary, both believed all areas of religion are meant to be reasonable and both also expressed that there were higher objectives behind Islamic law, both had undertaken an in-depth study of Maqasid (Higher objectives of Islamic law, which is also known as the spirit of the law approach). Both participants 2 and 8 were Maturidi Sunnis. They also both said 'yes' to the question 'Do you believe what is 'good' and 'bad' is naturally known to humankind?' though they disagreed on: 'If humans never had prophets, could they live fairly and prosperously?' Participant 2 answered 'yes.' Both were male and of age 20. Both expressed that 'Right and wrong can depend on the situation.' These two participants contrasted with the other participants in the following way:

These two participants, who were consistent -believing Islamic law was fair both implicitly and explicitly, differed with the remaining inconsistent participants in one educational area: The two consistent participants had undertaken an in-depth academic study of the higher objectives of Islamic law (Maqasid) also known as the spirit of the law approach, as mentioned. An approach that considers fairness and purpose as essential parts of law and law making (Auda 2008, 3, 4, 16, 34, 49).

In considering the responses of all participants to the statement, 'I believe Islamic law is fair' and 'I believe Islamic law is unfair,' we expected that the implicit results of the participants would show that they implicitly agreed with one but not the other. This was the case for participants 1, 2, 3, 4, 5 and 8. These may be considered correctly counterbalanced. This was expected, as an implicit response to one sentence should be the opposite of the other. However four other participants – 6, 7, 9, 10 appeared not to provide counterbalanced results. We consider these next.

For three of those four participants: participant 7, 9 and 10, we note that their implicit responses may be considered counterbalanced if we were considering a comparison of the relative magnitude values for the two opposite sentences. All implicit responses to the first sentence using 'fair' are many orders of magnitude larger than its opposite sentence 'unfair.' To visualize this we present the magnitude ratios below in table 3. The level of the N400 for the test sentence: 'Islamic law is unfair' is many orders smaller than the N400 for the opposite sentence. This indicates an aversion to the 'fair' claim that is many times more substantial than that to the 'unfair' claim. This

may indicate that they implicitly disagreed with the sentence ‘I believe Islamic law is fair’ to a far higher degree than its opposite. With Participant 6 however, given the high negativity for both sentences, despite being opposite sentences, we may consider that their response may be that of an outlier. Further studies on whether the N400 can be used as a scale of ‘agreement’ would be beneficial for the larger study to come - as will be outlined at the end of this paper.

Participant Magnitude ratio of the avg. Implicit results to both sentences: (Unfair/Fair)

Participant 7	$0.203/4.534 = 0.04\%$
Participant 9	$3.747/41.01 = 0.09\%$
Participant 10	$0.293/7.05 = 0.04\%$
Participant 6	$8.119/57.5302 = 14.1\%$ (outlier)

Table 3. Relative average responses to the two sentences ‘I believe Islamic law is unfair / fair.’

The second result of this study found that all participants held the implicit belief that Islamic law was unfair despite explicitly stating the opposite, except for two participants, participants 2 and 8. These two participants believed Islamic law was fair at both an implicit and explicit level.

Before discussing the reasons for this inconsistency in the implicit and explicitly expressed outcome, we consider the outcome of presenting the sentence ‘Sharia can never be irrational.’

Third Test Sentence Results

Instead of using the term ‘Islamic law,’ we used the term ‘Sharia,’ Sharia being a wider term used to describe Islamic law. We replaced ‘fair/unfair’ by the term ‘irrational.’ Thus the test sentence became: ‘Sharia can never be irrational.’ For visualization, the test responses are given in table 3.

Participant Number	Participant's Explicit Response to: 'Sharia can never be irrational'	Participant's Implicit Response to: 'Sharia can never be irrational'	Participant's avg. Implicit score (μV) to: 'Sharia can never be irrational'	Comparison of Explicit and Implicit result
1	False	True	7.2174	Inconsistent
2	False	True	1.526	Inconsistent
3	False	True	2.2694	Inconsistent
4	False	True	8.2501	Inconsistent
5	False	False	-0.0433	Consistent
6	False	False	-7.7214	Consistent
7	Unsure	False	-18.3416	Unknown
8	False	False	-1.6594	Consistent
9	False	False	-38.1368	Consistent
10	True	False	-0.4617	Inconsistent

Table 4. Explicit and implicit responses of all participants to the test sentence 'Sharia can never be irrational.'

All of the participants explicitly expressed disagreement with the sentence 'Sharia can never be irrational' through tapping except for one participant (participant 10), one other remained unsure (participant 7). However, of the participants who expressed explicit disagreement, four of them implicitly agreed with that sentence: Participants 1, 2, 3 and 4. That is, they implicitly held that Sharia can never be irrational (i.e., Sharia is always rational). Three of these participants (1, 3, 4) also implicitly held that Islamic law was unfair (table 1).

Here we pose the question: 'why was it that they implicitly held Sharia can never be irrational, yet also implicitly held that Islamic law can be unfair?' To answer this question we considered the questionnaire responses to see how the participants reasoned on questions such as the trolley problem (deontological, utilitarian, etc.) and it was found that participants 1, 3 and 4 had taken the view that it was rational to push one person off a ship that was sinking due to being used over its capacity in order to save the other passengers. This outcome may indicate that the participants (1, 3 and 4) thus held that Sharia is, from a consequentialist point of view, rational yet unfair.

A main finding thus appears to be that these three participants considered 'what is rational can be distinct to being fair.' It would seem to indicate that in their reasoning, laws that can be rationalised may not necessarily be fair. Such a view, the unfairness yet rationality of Islamic law, would be considered at odds with Islamic legal thought,

however, it appears that it was implicitly held by these participants. This being the case, it may highlight how individuals may hold implicit values that they themselves are unaware of, values that are at odds with their own explicitly expressed value system. This is not an uncommon finding as the Implicit Association Test, a psychological test method that uses timing to compare the strength of association, has shown that many individuals hold biases towards races and other social categories that they themselves were not consciously aware of (Nosek, Banaji, and Greenwald 2002).

We consider next why it was the case that a number of the participants (eight) exhibited an inconsistency between their implicit and explicit results. This inconsistency may be considered a form of cognitive dissonance as we shall explore. Further we will consider why these implicit responses may have materialised to begin with.

Discussion

Why the dissonance between implicit and explicit responses?

Cognitive dissonance is a negative drive state that occurs whenever an individual simultaneously holds two cognitions, be they ideas, beliefs, or opinions, which are psychologically inconsistent, whereby the opposite of one cognition follows from the other (Berkowitz 1978, 2). When an implicit response is found to be different to an explicit response, this may be an indication of cognitive dissonance.

For a Muslim to explicitly suggest that Islamic law is unfair, they could potentially be distancing themselves from their own group. This being too aversive a step to take due to group social and emotional attachment, dissonance may result. An alternate reason for the indication of dissonance may be rooted in the finding that there is a tendency to justify the current wider social order even if the status quo goes against one's personal interests (Jost, Banaji, and Nosek 2004). A common finding in the literature on system justification is that members of disadvantaged groups often adopt a negative stereotypical view of their ingroup, thereby protecting their beliefs about the fairness of the current wider social structure. From a cognitive consistency perspective, one may consider that such reactions have their roots in the conflict between the general belief that the existing social structure is fair and the specific belief that one's ingroup is disadvantaged. To the extent that individuals are motivated to retain their general belief about the fairness of the current system, they may restore consistency by adopting the belief that the ingroup is inferior (Gawronski 2012). This may also be a factor that helps to explain why some who identify with religious establishments that ought to

champion fairness, have in the past lent support to authoritarian regimes and unjust social structures instead of lending support to the ingroup that is being treated unfairly.

In addition, it may be that identifying Islamic law as unfair would be the same as suggesting that the 'way of life' of the Muslim community in which they lived was at fault. Protecting their beliefs about the fairness of the current Muslim social structure may have thus also led to the dissonance indicated by the study.

An alternative reason for the indication of dissonance may be as suggested by studies that consider cognitive dissonance to be in part due to 'ego-defense.' Consistency as a core motive for dissonance has been documented in cases related to mechanisms of ego-defense in justice settings (Konow 2000). It may be that maintaining one's view to be correct could have caused such dissonance.

Yet, despite these theories on possible causes of cognitive dissonance, neuropsychological work has demonstrated that dissonance in general might not always be a conscious strategic process (Lieberman et al. 2001). Anterograde amnesia patients, who had neurological damage affecting the functioning of medial temporal lobe and were incapable of forming new memories, were compared with healthy controls on a dissonance task. The amnesics had no memory of having performed a behavior that conflicted with their previously established attitudes and thus were not likely to have engaged in conscious strategic attitude change. Nonetheless, the amnesics changed their attitudes to the same extent as controls. These results suggest that, rather than conscious rationalisation, cognitive dissonance reduction may sometimes depend on implicit constraint satisfaction processes (Read, Vanman, and Miller 1997; Lieberman 2006).

Decisions emanating from implicit-explicit cognitive dissonance

Since the occurrence of dissonance is presumed to be unpleasant, individuals strive to reduce it by adding 'constant' cognitions or by changing one or both cognitions to make them 'fit together' (Berkowitz 1978). One of the ways cognitive dissonance is alleviated, is through rationalisation. Cognitive dissonance theory proposes that the agent is motivated to reduce this tension and may, in this context, do so either by reducing self-interested behavior, or by engaging in self-deception, or by some combination of the two. It is documented as a 'psychological' need (Festinger 1962). It is also seen in children when they seek a form of cognitive consistency (Egan, Santos, and Bloom 2007).

In such circumstances, when individuals perform a behavior or make a choice that conflicts with a previously established attitude, the attitude tends to change in the direction that resolves the conflict with the behavior. This process appears to involve a

rationalisation whereby individuals strategically change their attitudes in order to avoid appearing inconsistent (Jarcho, Berkman, and Lieberman 2011). Of the eight participants who displayed an indication of cognitive dissonance, believing Islamic law to be unfair at an implicit level, three appear to have rationalised their position on this. The study found that the three of the eight had held at an implicit level that 'Sharia was not irrational.' Thus, it appears that they had found a method to accept Islamic law as being a valid and true system of law by rationalising it's perceived unfairness. They did so by ascribing to a form of utilitarianism. To them, it was unfair to push a person off a boat to save the remaining passengers, yet it was the rational course of action. In the same way, it appears, they may have found Islamic law, or elements of it to be unfair, yet justified this by considering such framing as a rational and not irrational position to take on law.

Why did a conflicting implicit attitude manifest?

Irrespective of the method by which participants came to express a view that was contrary to their implicit attitude, there remains a further question. Why did eight of the participants have an implicit attitude that was at odds with Islam, the 'authority' that they believed in?

It may be argued from an empiricist perspective, one that holds 'values' as learned, that a 'value system' of any authority that is subscribed to and practiced would not cause any cognitive dissonance. This would be because the subscriber has submitted themselves to the worldview set by the authority. The values of the person are shaped by the said authority. Such was the case with the participants of this study. This was displayed in their anonymized confidential feedback questionnaire, none of the participants expressed they believed in an alternative worldview. Yet, for eight of the participants, the majority – seven of whom were seminary graduates and involved in religious teaching – it appears there was a factor that perturbed this attitude, one which may have led the mind to a form of cognitive dissonance. Given that – we suggest – it was not an alternate system of beliefs, it may be that the factor that caused this perturbation was actually an innate sense of both fairness and purpose. For without such an innate sense, where else may they have a point of reference that contradicted their system of belief? This hypothesis is also made based on additional information found in this research: The consistency of the implicit and explicit result found with the two participants who subscribed to the Maqasid legal school of law. The school places a determination of fairness and purpose as recourses that are essential to law (Auda 2008, 3–4, 32). We expand on this further, next.

In among the participants were two who had undertaken an in-depth academic study of school of Maqasid, also known as the spirit of law school. The school places authority in the concepts of fairness and purpose, instead of relying on a literal reading of the source texts (Auda 2008, 3–4,32; Ashur 2006). This allows a jurist to change textually mandated laws when a context changes. A law that is fair in one context may not be fair in another, in part because the purpose of the law is no longer met. Consideration of the fairness and purpose of law is central to this school. Law is not seen as dogmatic or irrational, but open to reason. The law's main intentions are seen to revolve around protecting and upholding people's interests, the acquisition of benefit, and mitigation of harm. Early legal scholars such as al-Shatibi articulated these in five main objectives, the protection of life, religion, progeny, wealth, and intellect. These objectives collectively represented the telos to which reasoned deliberation in the law must aim (Emon 2010, 116).

This epistemology of law allows for recourse to fairness and purpose, compared to non-Maqasid schools which rely solely on the text, its authority, in a more literalist approach to law (Jackson 2006). Thus, it may be the case that the Maqasid school allowed a participant's attitude towards law not to clash with their innate human expectation that law needed to be both fair and of purpose. The school may have allowed for a human expectation of fairness and purpose in law to remain unfettered and to implicitly manifest.

Furthermore, the two participants were of the Maturidi theological school that takes a nativist approach to morality, suggesting that good and bad can be recognised without recourse to source texts. However, other participants also adhered to this theological school. It may thus be put forward that, without recourse to a legal mechanism (i.e., Maqasid) that considered fairness and purpose as essential to law and law making, a clash with an innate, nativist expectation occurred. The Maqasid legal school holds a practical methodology. Thus, it appears that in taking a Maturidi stance in theology without a Maqasid practical stance on law, an innate sense of fairness and purpose could not find a practical method to express itself, resulting in cognitive dissonance.

In the case of those participants who did not subscribe to the Maqasid school, and thus effectively subscribed to more literal approaches, placing far more authority in the text, studies have found that such authority lends itself to a form of legal formalism, one where the law appears to the person holding this schema as complete and univocal (Lyons 1998, 258). It has also been found that those holding such attitudes, whereby law is seen as unchanging, exaggerate the role of the text and minimize the role of the human agent who interprets it (Fadl 2009, 98). The more literalist the approach to law

is, the less the concern with its consequences – so far as the wording has been enacted irrespective of its context.

In essence, what the overall findings may thus be suggesting, is that ‘there are innate qualifications of fairness and purpose’ and that these ‘continue to persist at an implicit level despite an individual’s subscription to an alternative set of values.’

What may be put to challenge this thesis is that, despite the majority’s commitment, practice and seminary learning, the negative implicit results were not due to a clash with an innate sense of fairness and purpose, but were due to a clash with a unconscious learned value system that they unconsciously subscribed to. One that they were not fully aware of. One that considered Islamic law to be unfair and without tangible purpose. However, such would need to be substantiated with the results of the participant’s belief on this topic, and the current study found that all the participants believed in the prophethood of Muhammed and truth of his message.

An alternative challenge may be that a person’s own ego could be a cause for cognitive dissonance. Hence, it may be that a subject’s own egotistic aversion to act fairly alters their implicit response towards such a question as ‘I believe Islamic law is fair.’ If this could be indeed established, then an additional or alternative hypothesis for the results may be that ‘the state of a subject’s ego will reflect in their implicit data’ – whereby the eight who had negative implicit results had not ‘sufficiently controlled their ego’ to be at ease with the concept of acting fairly, compared to the two who had ‘controlled their ego’ sufficiently to be content with acting fairly. While Islam and it’s Sufi dimension has within its approach a method to assist an individual to overcome their ego, one that would have an effect on character, the challenge with this theory is that, as it currently stands, the N400 ERP has demonstrated itself as a method by which it establishes core knowledge and belief violations as detailed above, and not the detection of the factor – be it confounding – of a person’s own ego.

Innate qualifications of law?

Two elements that make up law are undoubtedly fairness and purpose. Whether human beings are naturally good, bad, or neither, has been a starting point upon which legal philosophers have built their theories, particularly those which relate to social contracts.

In developmental cognition terms on teleological reasoning, an attempt to reduce children’s broad teleological bias was carried out in a study that attempted to introduce a pre-trial that described, in non-teleological terms, the physical process by which non-

living natural kinds form. In spite of this attempt, the study replicated the effects of an earlier study in which no pre-trial information was given as to the reasons behind these physical processes (D. Kelemen 1999). It has also been found that young children are prone to generating artifact-like teleo-functional explanations of living and nonliving natural entities and endorsing intelligent design as the source of animals and artifacts (Deborah Kelemen and DiYanni 2005). The same study also revealed that children's teleo-functional and intelligent design intuitions about natural phenomena are interconnected. Indeed the authors opined that children's teleo-functional intuitions might reflect an infeasible, innate, cognitive bias. This tendency becomes more selective as children acquire increasingly coherent beliefs about causal mechanisms (Lombrozo, Kelemen, and Zaitchik 2007). Teleological reasoning has also been shown with one-year old's (Gergely and Csibra 1997). At around ten to twelve years of age, the preference for teleological explanations lessens (Cruz and Smedt 2015). Yet a preference for teleology persists throughout life, with a distinct developmental continuity observable of a preference for teleological explanations (Lombrozo, Kelemen, and Zaitchik 2007) leading some to put forward the view that teleological reasoning may be innate (Deborah Kelemen and DiYanni 2005).

On fairness, capuchin monkeys have demonstrated a strong aversion to its absence in food share amongst its peers (Brosnan and de Waal 2003) (Lakshminaryanan, Chen, and Santos 2008). In humans, Hamlin has shown an expectation of fairness and an aversion to unfair behavior in 6 and 16 month old babies (J. K. Hamlin 2015). They contend that although active prosocial behaviors emerge after birth, they are unlikely wholly the result of brute socialization: They find that they occur spontaneously, are present in primates, and are intrinsically motivated (Aknin, Hamlin, and Dunn 2012). By the end of a child's first year, infants categorize goal-helping as positive and goal-hindering as negative. Like adults, infants appear to evaluate others as good and bad mentalistically: 'Good guys are those who knowingly and intentionally facilitate a third party's goal' (Kiley Hamlin et al. 2013).

The expectation of fairness in infants also appears to be projected onto others. Infants have been shown to expect that individuals, treated fairly and unfairly in a resource distribution task, would prefer the fair distributor (Geraci and Surian 2011). Infants from as early 3 and 4.5 months of age have an aversion to hinderers over helpers (Kiley Hamlin, Wynn, and Bloom 2010; J. Kiley Hamlin 2013). Hamlin thus concluded that from extremely early in life, human infants show morally relevant motivations and evaluations — ones that are mentalistic, nuanced, and do not appear to stem from socialization or morally specific experience.

Amazonian Ultimatum Games and the universality of fairness in humans?

It also appears that the characteristic of fairness is universal (Brosnan and de Waal 2003). Moral judgements activate brain regions that are involved in mentalising, including the medial frontal cortex. A study that compared patients who suffered lesions in this region at a young age and those whose cortex was damaged in adulthood found patients with childhood lesions presented with defective social and moral reasoning, whereas this was not evident in those with later damage (Anderson et al. 1999).

To investigate the possible variations on how resources are shared from culture to culture, a study found that a tribe in the Amazon made do with smaller shares in ultimatum games (Henrich 2000), which they suggest may demonstrate that the qualification of fairness is different from culture to culture. This was repeated in fifteen different societies with similar variation in the amount of money offered in the Ultimatum Game (Henrich et al. 2001). Yet, these studies regrettably did not ask the question 'would the individuals taking the larger share and offering the lower share have wished the same for themselves?' It seems the study missed a critical factor in its consideration of the outcome. Consideration of how others are similar to oneself is of prime importance in hypothesizing the outcome of these games. This has been demonstrated in more recent social cognitive neuroscience research that involve economic exchange with social dynamics. These studies use paradigms such as the Ultimatum Game (Sanfey et al. 2003) to examine the neural responses associated with cooperation, competition, fairness, and trust. Across these studies, cooperation, trust, and fair play typically activate the VMPFC, MPFC, and MPAC (Decety et al. 2004; McCabe et al. 2001), whereas unfair and untrustworthy responses activate insula (Sanfey et al. 2003), caudate in the basal ganglia (de Quervain et al. 2004), or DMPFC (Decety et al. 2004). The finding that cooperation, relative to competition, promotes MPFC rather than DMPFC activity, is also consistent with previously described work (Mitchell, Banaji, and Macrae 2005) such that cooperation may be associated with seeing the other players as more similar to oneself, since cooperation, relative to competition, promotes MPFC rather than DMPFC activity (Lieberman 2006).

This is consistent with our stipulation that a study on fairness in ultimatum games ought to pose the question 'does the player wish the same share for themselves.' Considered symmetrically: If the opposite player were themselves, would they offer the same share? Such a question would allow us to assess whether or not the player views the other person as similar to themselves, in which case, the above social cognitive neuroscience research appears to suggest that the player would more likely be fair to them.

Across these studies on fairness and trust, the fairness of the decision-making process has often been confounded with the material value of the outcome. That is, fair responses from a partner are typically associated with better financial outcomes for the subject. Tabibnia recently manipulated the material payoffs and the fairness of the partner's behavior independently. After controlling for material payoffs, fairness still activated an array of motivation- and reward-related regions, including the VMPFC, ventral striatum in the basal ganglia, and amygdala, which suggests that fairness is hedonically valued in social interactions (Lieberman 2006).

We also suggest that asymmetrical relations can belie a self-centered cognition. Thus, exploitation ought to be considered as a behavioral factor to be measured in ultimatum type studies, particularly when a society is scarce of resource and individuals can often 'make do' with that they receive. The knowledge of this circumstance can spur a person in power to take advantage of the situation and offer less than they would outside of this context.

Context: Law, morality and cognition

Within early Muslim jurisprudence, two approaches to law existed. One was based on source texts, whereby the source texts defined justice, compassion, benefit and harm. The enterprise took to an empiricist type of approach towards morality. The second school of law saw in the source texts representations of justice, compassion, the acquisition of benefit and mitigation of harm. This form of reasoning also manifested itself in a specific method for arriving at law, a method that became known as *istihsan* (juristic preference). It was driven by reasonableness, fairness, common sense and public interest set as deriving the most good and mitigating the most harm, both of which involved reasoning that did not appear to be directly based on the source texts (Izzidien In Press; Hallaq 2005, 116). *Maqasid* began to be developed as a bridge between the two approaches to law (Izzidien In Press). The theological stance of the Maturidis, Atharis and Mutazilites allowed for a rationalisation of law that set its purpose as being the benefit of humankind, set in fairness – not one based in dogma and literalism. In the current twenty-first century, Muslim Democrats have taken to *Maqasid*, seeing it as an authentic means for the re-interpretation of law to allow it to remain dynamic and suited to new contexts (Glancy 2007, 35). Some recent reformers have, it has been suggested, attempted to use *Maqasid* as a means beyond what it was intended for (Emon 2010, 188). How law is articulated today in many countries in the Muslim World have their

roots in these early discussions found in Islamic legal theory. These discussions continue today in similar lines to those on legal formalism and realism.

Follow up studies – two new hypotheses.

With the inductive part of the study complete, we are now able to set two new hypotheses to be examined.

The first hypothesis would be 'Ascribing to the spirit of law school of thought (Maqasid) exclusively produces an implicit belief that Islamic law is fair.' To test this hypothesis we would need to recruit two larger groups of participants, one that ascribes to this school and a second that specifically does not. Larger groups will allow the study to be more representative. It may also be useful to consider, in a third study, whether the implicit views of the latter school could be changed – if any of them were to want to reconsider their views after the study.

The second hypothesis would be on the 'nativism and empiricism' area of study in this paper. While most studies on this revolve around developmental cognition, given that babies and infants have yet to be 'socialised' into taking up a set of values, providing ideal for research into such studies, we propose an alternative method usable in adults.

Given the empiricist approach holds that values held are always learned, we would seek to find adults who subscribe to a named value system (or authority), implicitly and explicitly, be it religious or non-religious. Of these adults we would attempt to detect any discrepancy between their expressed views and implicit views on the values associated with that named value system (or authority) (e.g., it's fairness). Where such a dissonance occurs we would seek to decide if such a dissonance could be related to an innate factor or to an alternate socialised learned factor using implicit values measures. The study would ask if it is indeed possible for an adult to hold implicit values that contradict nativist theories on innate values. These methods could naturally be extended to other forms of concepts. The measurement of implicit responses to a wide array of values would be necessary in order to remove confounding factors.

This study may be further extended to the study of law in general and that of judgments made by judges who subscribe to an ideology, as their judgments may also be unconsciously biased. This has been found in research on bias, political ideological subscription and court case outcomes in non-implicit data research on the topic (Sunstein et al. 2007).

Further, fMRI data on moral decisions has shown that moral problems given their personal dimension, activated a medial frontoparietal network along with LPAC to a

greater degree than an impersonal condition, consistent with notion that a personal condition promotes self reflection on the implications of one's contribution to the outcome. Whereas an impersonal condition, in contrast, leads to greater activity in lateral frontoparietal regions than does the personal condition, consistent with an external focus on events in the world (Greene et al. 2001) (Mendez, Anderson, and Shapira 2005) (Lieberman 2006). It may thus be useful to investigate how individuals with the indications of dissonance found in this study, those who rationalised their moral decision to push a person of a ship to save the others, against those who did not rationalise their decisions, compare under fMRI during these evaluations.

Conclusion

In this study, we sought to detect the implicit beliefs of participants towards the fairness of the law that they followed, in this case Islamic law. Eight participants who had not studied the Maqasid spirit of law school and who were only familiar with a school of law that places an emphasis on the religious texts above that of a determination of fairness and purpose, appeared to exhibit a conflict between what they implicitly believed and what they claimed to believe. It may be that this conflict arose because their epistemology of law did not coincide with a theorised innate sense of fairness and teleological reasoning. If aspects of their law were perceived as unfair and lacking purpose, yet their legal school opposed considerations of these perceptions, then a form of dissonance, between explicit and implicit beliefs as found in the paper, may have been the outcome. Further, a person with such may have had to seek alternate ways to ameliorate this inconsistency. This may have taken the trajectory observed with those participants in this study who differentiated between that which is rational and that which is fair. Indeed a more literalist approach to law can be less concerned with the outcome than loyalty to the meaning of the texts used in law. The study of the cognition of law may offer us new perspectives on legal perceptions, especially those that seek to make fair judgment, be it through social contracts or non formalised legal systems.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

AI proposed the study and its content; AI & SC designed the study; AI conducted the experiment; AI analyzed the data; AI wrote the manuscript, SC contributed to the editing of the manuscript.

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