



AMERICAN UNIVERSITY OF BEIRUT

EXPLICIT AND IMPLICIT ATTITUDES, AND  
DISCRIMINATORY BEHAVIOR IN A LEBANESE STUDENT  
SAMPLE: AN ERP STUDY USING THE ULTIMATUM  
GAME

by

ARIJ WALID YEHYA

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ARIJ WALID YEHYA

Approved by:

\_\_\_\_\_  
Dr. Arne Dietrich, Professor  
Department of Psychology



Advisor

\_\_\_\_\_  
Dr. Charles Harb, Associate Professor  
Department of Psychology

  
Member of Committee

\_\_\_\_\_  
Dr. Nadiya Slobedenyuk, Assistant Professor  
Department of Psychology

  
Member of Committee

Date of thesis defense: December 21, 2013

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# AN ABSTRACT OF THE THESIS OF

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Title: Explicit and Implicit Attitudes, and Discriminatory Behavior in a Lebanese Student Sample: An ERP Study using the Ultimatum Game.

Lebanese youth claim to have positive social emotions towards their own sect. However, explicit self-reports of such attitudes may not be in line with implicit attitudes that might lead to discriminatory behavior. Several studies supported the idea that there are discrepancies between explicit and implicit attitudes. The following study examined the discrepancies between implicit attitudes, behavior and explicit beliefs on one kind of intergroup interaction: ingroup favoritism. We turned to the ultimatum game, which is a widely used decision-making task. We tested for possible reflection of implicit attitudes at the electrophysiological level. We also explored discriminatory behaviors by examining the rejection rates of different kinds of offers (fair, moderately unfair and strongly unfair) in different conditions. Explicit attitudes were measured using self-report sectarianism scale.

The study recruited 45 participants to play as responders in this game while having their electrophysiological activity recorded using EEG. A 3x3 mixed design was implemented. The within-group factor was the fairness of the offer. Each participant received fair, moderately unfair and strongly unfair offers. The second between-group factor was group interaction. We manipulated three different group interactions, those with someone from the same sect, interaction with someone from a different sect and a condition where the sect was not mentioned. Separate mixed ANOVAs of behavioral and electrophysiological results were carried out. For the behavioral results, there was no significant effect of the group interaction. However, as expected, the fairness of the offers affected rejection rates. For the electrophysiological results, the observed effect was on the kind of offer where the MFN elicited more negativity as the offers became more unfair. P300 was significant in all the different condition with no within-group difference. Results also showed that LPP did not reflect implicit sectarian attitudes. The limitations of this study are presented and recommendations of future research are proposed.

*Keywords*: Explicit attitudes, ingroup favoritism, implicit attitudes, discriminatory behavior, ultimatum game, ERP, MFN, LPP, P300.

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## CHAPTER I

### SECTARIANISM IN LEBANON

Lebanon is a country known to have diversity with respect to religions and ethnicities. In addition to the present different ethnicities, such as Arabs, Armenians, and Kurds, Lebanon holds up to eighteen different sects. Haddad (2002) argues that of the eighteen sects, five have been the most central in shaping its modern history: Islam (Sunni and Shiite), Christianity (Maronite and Greek Orthodox), and the Druze religion. In this chapter, we first provide a brief summary of the history of Lebanon. Second, we define sectarianism. Finally, we discuss the research done in this context.

#### **Brief History of Lebanon**

In 1943, Lebanon became an independent country. The division of governing was lead by different sects as addressed by the National Pact. However, this unofficial agreement among the Lebanese leaders failed to maintain civil order. This led to a civil war in 1975, which lasted for 15 years (Traboulsi, 2007). In 1990, after international efforts to put an end to the war were made, the Taif Agreement was adopted (Makdisi, 1996). This agreement did not change underlying features of the political system in Lebanon. It proposed an equal balance of authority between Muslims and Christians in parliament. This was the agreement that was able to put an end to the sectarian violence in the country.

Today, the population within each of the sects is not officially reported and only estimates are provided. The official census, in 1932, showed that in Lebanon the

Muslims made up about 48% of the population with 22% Sunnis, 20% Shiite, 7% Druze. Christians were about 52% of the population with 28% Maronites, 10% Greek Orthodox, 6% Greek Catholics and 7% other Christians (Juermgensmeyer & Roof, 2012; Traboulsi, 2007). That was the last official census conducted in Lebanon. In 2005, the data on Lebanese citizens registered to vote showed that the percentage of Shiite and Sunni Muslims were 27% each. The Druze, Maronite Christians, and other Christians were 6%, 21% and 19% respectively (Salti & Chaaban, 2010).

The Taif Agreement was announced as a strategy to encourage peaceful coexistence; however, it's effectiveness is debatable. Although it put an end to the military clashes between the different Lebanese sects, peace has been interrupted by several incidents. Recently, several assassinations of politicians (Haddad, 2009), the Israeli war on South Lebanon in 2006 (Haddad, 2002) and the events of May 7, 2008 (Haddad, 2009) nurtured and fed the sectarian attitude between Lebanese citizens.

Kingston (2013) argues that sectarianism takes multiple forms. The first is a formal one. Lebanon is an example of systematic legal discrimination between different sects that has been explicitly incorporated in the political system. This is referred to as confessionalism. The different sects share the political power formally. Kingston (2013) claims that there is also informal facet to sectarian dynamics. Sectarianism can consolidate far from the government in civil and political society. The third form is on a micro-level. Sectarianism can be referred to individuals' identity as belonging to a religious group. The latter form is the main interest of this study.

### **Sectarianism**

Sectarianism, or what is commonly known as "Taifiyya" in Lebanon (Makdisi, 1996), is a form of in-group and out-group dynamics. It refers to a bias that people hold

towards their own religious group (Harb, 2010). Kingston (2013) argues that sectarian culture originates from an interaction between socioeconomic and political factors. This “culture of sectarianism” remained years after the civil war was over (Makdisi, 1996).

Moaddel, Kors and Garde (2012) analyzed surveys done in Lebanon in 2008 on 3,039 individuals as an attempt to examine the reasons behind the persistence of prejudicial attitudes towards those from different sects. The results showed that power relations did not significantly account for the prejudicial attitudes. However, religious fundamentalism, which is the attitudes towards one’s own religion, was significantly correlated with the persistence of sectarianism. Interestingly, attitudes towards foreign interventions showed a positive significant relationship with sectarianism. This implies that, those who advocate the foreign interventions that support their sect score high on sectarianism. However, this might not be a cause for sectarianism but a by-product of being inline with favoring one’s sect.

Harb (2010) explored the prevalence of sectarian attitudes in a representative sample of Lebanese youth. A sectarianism scale was administered along with other questionnaires to 1200 individuals between 18 and 25 years of age. About 42% of the participants attended a university. Results showed that the Lebanese youth scored high on the sectarianism scale. This shows that they had prejudicial attitudes biased towards their own sects. It is important to note that the high level of sectarianism in this youth sample did not differ between sects. Nor were there differences between females and males. In addition, a third of the participants expressed negative emotions towards outgroup members. Because participants self-reported their attitudes and feelings, the results were not based on behavior. In other words, Harb’s (2010) study demonstrated only an explicit sectarian bias in attitude among the Lebanese youth.

In the Lebanese context, Harb (2010) showed that there is ingroup favoritism among the Lebanese youth exists. Sectarianism can take various forms. However, the only form that is relevant to our study is on the individual level. Moreover, other kinds of intergroup interaction may also be present in Lebanon. For example, Moaddel et al. (2012) showed Lebanese individuals to have negative feelings towards outgroup members. This study focused on one type of intergroup interaction in the Lebanese context: ingroup favoritism in an attempt to build on previous research.

## CHAPTER II

### INTERGROUP INTERACTIONS

Different phenomena factor into this intergroup relation in Lebanon. Sectarianism is a set of stereotypes, attitudes and prejudice. These factors can either be implicit or explicit. Some Lebanese may not express sectarian attitudes but might still discriminate between in-group and out-group members, without being aware of that behavior. Sectarianism can also lead to discriminatory behavior, be it automatic or controlled. However, there is still no national study that produces a scheme of how sectarianism plays itself out on an individual level. Studies on intergroup attitudes and behavior in social psychology have been presented as a conceptual framework in an attempt to explain sectarianism in Lebanon.

Research on intergroup interactions is a prominent field of inquiry in social psychology. This is evidenced by a large number of theories that address intergroup interactions. The main concern does not lie with individuals' thoughts and feelings about a certain group. The assumption is that such feelings and thoughts might shape behavior (Bodenhausen & Richeason, 2010). This behavior might have consequences such as discrimination.

In this chapter, ingroup favoritism is defined. Then, the discrepancies between explicit and implicit attitudes and behavior are provided. The possible measures for each are then discussed. Finally, previous research in this context is presented.

### **Ingroup Favoritism**

In-group/out-group discrimination is an intergroup type of interaction that can have one of three forms (Brewer & Brown, 1998). The first form is in-group favoritism. In this situation, discrimination stems from positive attitudes towards those who belong to the same group. The out-group members receive neither positive nor negative affect. The second kind of discrimination happens when there are derogatory attitudes toward others and hostility between individuals and those who belong to groups other than their own. This is also known as out-group differentiation. The last form is intergroup social competition, where favoring the in-group might put the out-group at a disadvantage. Hence, discrimination can manifest itself in a range of phenomena: from mild favoritism of group, to disrespecting the out-group members, to having intergroup bloodshed (Hogg, 2013).

Research showed that the three forms of discrimination were independent of each other (Brewer & Brown, 1998), meaning that in-group favoritism does not necessarily occur simultaneously with out-group bias (Turner 1978). On the other hand, out-group biases are caused by several factors other than in-group favoritism (Struch & Schwartz, 1989). Hinkle and Brown (1990) found inconsistencies in the correlation between in-group favoritism and out-group derogation.

### **Explicit Versus Implicit Attitudes**

The presumption that the expressed attitudes are predictors of behaviors of individuals in the social world is debatable. A meta-analysis carried out by Dovidio et



al. (1997) presented the differences between scores on implicit and explicit measures of prejudice. The differences between these two instruments supported the presence of underlying spontaneous attitudes towards different social groups. Even though there were many disputes over the validity of these implicit and explicit measures of prejudice, the gap between automatic and conscious prejudice became broadly recognized and endorsed (Bodenhausen & Richeason, 2010).

Devine (1989)'s conceptual understanding of automatic stereotypes and prejudice that receives to this day considerable attention. Devine's (1989) study demonstrated how knowledge about stereotypes is similar for people, regardless of their score on explicit scales of prejudice. Her study showed that stereotypes are inevitable in various cultures, and that individuals unconsciously learn them. These prejudiced beliefs then drive discriminatory behavior that people may not be aware of. Devine (1989) added that these implicit prejudices can always make their way into people's attitudes, even if individuals deny having them. Thus, the intergroup discriminatory behaviors could be described as mental reflexes.

Bargh, Chen and Burrows (1996) studied the extent to which social environment produced uncontrolled behavior. The results showed that the activation of a stereotype resulted in a behavior consistent with it, although the participants were not consciously aware of it. They concluded that having implicit or explicit prejudices or stereotypes can result in discriminatory behavior, unless the individuals holding them puts effort into trying to avoiding such biases. Before we discuss the research on the discrepancies between implicit and explicit attitudes, we briefly present how each could be measured.

## **Measurement**

Explicit attitudes can be measured using reliable self-report scale. Ito, Thompson and Cacioppo (2004) measured explicit racial attitudes using the Modern Racism Scale. In our context, sectarianism scale has good reliability and could imply explicit sectarian attitudes, as demonstrated by Harb (2010). Measuring explicit attitudes usually depends on the kind of study conducted. For instance, Payne (2001) aimed to find the discrepancies between controlled and automatic processes. They utilized the Motivation to Control Prejudice Reactions Scale developed by Dunton and Fazio (1997) to test these discrepancies. This scale allowed the comparison between the extent to which people can control their automatic behavior.

There is a handful of measures that is used to test for implicit attitudes. Implicit Association Test (IAT) is one of them (Greenwald et al., 2009). However, much of the debate points is whether IAT can pick up stereotypes that are commonly known in society rather than those endorsed by individuals.

A growing body of research is identifying implicit attitudes using neuroscientific technique (Stanley, Philips & Banaji, 2008). Many advantages to this technique exist. First, measures in neuroscience provide the multifaceted nature of attitudes (Ito et al., 2004). Second, the techniques to monitor the process that starts with categorization, move to unfolding of emotions and end with behavior (such as decision-making). The Electroencephalogram (EEG) is an example of a neuroscientific technique. The EEG records electric brain activity. It has a high temporal resolution. In other words, this technique provides differences in electric activity that might occur within milliseconds.

Rilling (2011) argues that the role of social neuroscience is not to enhance our understanding of social phenomena, but to grasp how the brain can give rise to social

cognition. This alone is significant in the field of psychology. Such research has an important function with regard to domain-general function in the human brain. Some brain areas that are responsive to social interaction are well known to have primitive general functions.

For instance, the insula and anterior cingulate cortex are responsive to physical pain. Their ultimate function is to protect from harmful stimuli. Research using the ultimatum game supports the idea that these regions are also activated when individuals are treated in an unfair manner. These systems adapt to new environments in which social skills become an important survival skill in the evolution of primates. Thus, the insula and the anterior cingulate cortex also detect harmful social stimuli and have evolved to punish free-riders in their environment. In the process of adapting these old systems to novel demands, the systems may well have been modified (Rilling, 2011). Human brain systems may be adapting to integrate both social and non-social functions.

### **Research**

Payne (2001) conducted several studies that examined the discrepancies between automatic biases, controlled processes and explicit racial attitudes. Across a series of two experiments, Payne asked participants to accurately select only weapons from a series of handguns and hand tools. The participants were primed with photographs of black and white males. Payne expected that racial primes might affect two different variables: reaction time and accuracy of identifying a weapon. In addition he analyzed the differences between the previously mentioned variables and (explicitly) reported racial attitudes. The only difference between the two studies he conducted was in the later study, the select process was time limited. Note that all participants were white.

When the time was infinite, black primes made it easier for participants to identify the weapon. When time was limited, participants made more errors identifying hand tools as weapons significantly more in the black prime conditions. The author concluded that two conditions ought to be fulfilled so that racial bias is shown behaviorally shown. First, is that there should be a racial prime. Second, the chance for second guessing one's response should be restricted. This study supports the dissociation of automatic and controlled processes that result in racial biases. These findings could be explained as follows. When participants had the time to control their automatic responses, the racial biases were reduced. This supports Devine's theory on the automaticity of stereotypes. In addition, Payne (2001) reported "the motivation to control prejudice moderated the correlations between explicit attitudes and implicit bias" (p. 190).

Social cognition is composed of several specific processes such as facial perception (Gobbini & Haxby, 2007) and activating attitudes (Cunningham & Zelazo, 2007). Our concern in this paper is only with the latter. Ito and Bartholow (2009) reviewed the relevant research and models on the neural correlates of race. Following racial categorization, prejudices are activated and would most probably alter behavior. According to the available research, the neural systems involved in negative or positive feelings and beliefs include, but are not limited to, the following: amygdala, anterior cingulate cortex (ACC), dorsolateral and ventrolateral prefrontal cortex (Cunningham & Zelazo, 2007).

On one hand, amygdala activity is reported to be elicited differently by contextual facial features of outgroup and ingroup members (Ito & Bartholow, 2009). With regard to this experiment, facial features cannot accurately indicate different sects.

Hence, we do not expect any activity in the amygdala that relates to this specific type of intergroup interaction.

On the other hand, the ACC and prefrontal cortex (PFC) are expected to be involved in behavioral regulation (Ito & Bartholow, 2009). Several studies support this statement. As mentioned earlier in Payne's (2001) findings, individuals can control racial biases that are driven by automatic processes. Studies using fMRI have shown an increase activity in ACC and PFC during controlled racial bias responses (Kern et al., 2004; Yeung, Botvinick & Cohen, 2004). The involvement of ACC in the controlling responses driven by racial biases is supported by research carried out using EEG. Amondio et al. (2008) showed there is an error-related negativity (also known as medial frontal negativity; MFN) that originates from the ACC. This event related potential is elicited under errors of identification of a weapon after a black prime. The error-related negativity is more prominent in those with motivation to control racial biases.

Saarela et al. (2007) showed that the ACC is part of the neural circuit that is activated during the perception of others in pain. Xu et al. (2009) showed that racial group membership modifies empathic neural responses. The ACC had an increased activity when the face in pain belonged to the same race as the participant compared to that of a different race. This shows that the ACC activation is moderated by racial biases. Importantly, these biases were shown in explicit ratings of others' pain. This adds to the dissociation of automatic (affective) and controlled (conscious) processes. Xu et al. (2009) noted that these findings provide an explanation for individuals having greater intent to help people belonging to their own race versus those of another race.

Ito et al. (2004) questioned whether the Late Positive potential (LPP) is elicited differently for ingroup members versus outgroup members. The experimenters showed

the participants different faces while recording their brain activity. They asked them to report if they “like” or “dislike” the faces. These two previously mentioned variables were a reflection of implicit attitudes. They compared these results with the explicitly reported feelings towards ingroup/outgroup members, as measured using the Modern Racism Scale. The findings showed that LPP was elicited during the presentation of black and white faces. However, there was no significant difference in LPP between black and white faces. Interestingly, the response to the different faces was in fact moderated by explicit attitudes reported by the Modern Racism Scale.

Findings showed that facial categorization is indicated only after 250ms of the face presentation. This negative event-related potential, also known as N200, is only elicited by facial features (Kutoba & Ito, 2009). More importantly, Ito et al. (2004), found a significant correlation between the Modern Racism Scale and LPP. The authors concluded that the LPP reflects category-based affective reaction. Further analysis showed that LPP and likeability of different faces were not correlated. This dissociation allows the experimenters to conclude that LPP reactions were driven implicitly, more automatically.

In sum, this study provides a key overlap between different types of prejudice measures. They are reflected in LPP and the responses on Modern Response Scale. However, individual’s likability did not show implicit attitudes.

As supported by research, the predictive role of prejudicial attitudes on individual’s behavior is not known. According to Harb (2010), most of the Lebanese youth endorse prejudicial attitudes. However, Harb’s (2010) experiment does not establish whether prejudicial attitudes are consistent with the discriminatory behaviors among the Lebanese youth. Moreover, it does not establish that the discriminatory

behavior is implicit and may substantially differ from explicitly expressed attitudes. To our knowledge there are no neuroscientific studies on sectarianism; however, many studies on intergroup interactions especially on race are available. To derive more specific and accurate hypothesis, we looked at neural correlates and event-related potentials that reflect race.

## CHAPTER III

### OVERVIEW OF RESEARCH ON THE ULTIMATUM GAME

Interactive tasks are useful to elicit social emotions. For example, Eisenberger et al. (2003) studied social exclusion by asking subjects to play in a virtual ball-tossing game from which they were ultimately excluded. Other interactive tasks, known as social decision tasks, require the participants to take a decision in a social situation. Social decision tasks are used in experimental economics, cognitive neuroscience, and social psychology to address research questions in the field of social decision-making. They allow behavior to be modeled mathematically, creating a platform to compare behavior across various conditions. In addition, these tasks are easy to manipulate in lab settings. One example of a social decision task is the ultimatum game, which demonstrates bargaining behavior. It is mainly used to study individuals' responses to fairness in different conditions.

The ultimatum game was first used by economists, prior to its introduction to the field of psychology in 1983 (Guth, Schmittberger, & Schwarze, 1983). It requires two players to take on different roles: a proposer and a responder. A third party provides a fixed amount of money to the proposer who must then offer a share of it to the

responder. The responder can accept or reject this offer. If the responder accepts the offer, they both get their share. If, however, the responder rejects the share, both end up with nothing. Both the proposers and the responders are informed about the rules of the game at the outset.

The ultimatum game allows an interaction between two strangers, one of whom has the ability to inflict direct punishment. This makes it possible to control the effects of future social interactions and past negotiation experiences while examining responding behavior (Wischniewski et al., 2009). This game is also straightforward and does not include a wide array of strategies to choose from (Eckel & Grossman, 2001). For instance, responders are required to either cooperate by accepting the offer given, or by rejecting it. However, more than thirty years of research has shown that the motivations behind the outcomes in the ultimatum game are various and diverse (Guth & Kochner, 2013).

It has been proven that the ultimatum game is a valuable task in studying a diversity of phenomena in various fields (Guth & Kochner, 2013). For instance, the results of the game provided insight regarding the allocation of property rights (Ellingsen & Johannesson, 2004). The responses in the ultimatum game also describe racial differences in responding to fairness (Griffin, Nickerson & Wozinak, 2012). This section first outlines the theories that explain behaviors in the ultimatum game. These include maximization theory and fairness concerns. After that, factors that vary the behaviors in the ultimatum game are presented, such as culture, age, gender and stake size.



## **Fairness Concerns**

Research over the past thirty years has focused more on the motivation, or the drive, to reject offers than on the behavior patterns of the proposers in this game. In other words, the reason behind actively turning down a certain amount of money has been a huge research interest (Sanfey, 2009). The maximization theory was developed by economists to predict people's reactions in bargaining games. This theory states that in decision-making tasks, individuals tend to maximize their self-interest (Smith, 2000). The theory assumes that both players are solely concerned with the amount of money they receive. Accordingly, economists reasoned that in the ultimatum game the proposer should offer only a small amount of money and, similarly, the responder should approve any share as long as it is not a zero amount (Kahneman & Tversky, 1979). A rejection would mean that both players lose.

Guth et al. (1983) tested this theory in the laboratory with surprising findings. The results indicated that proposers usually offered about 40% of the initial stake and the responders rejected any offer less than 30%. Also, a share that is less than 50% of the initial stake size is perceived to be an unfair offer, while an equal split of the money is considered a fair one. It was obvious that the manner in which the participants played was not in accordance to monetary self-interest and maximizing their outcome. Other factors weighed in on the decisions that participants took during the ultimatum game.

Guth et al.'s (1983) unexpected results were replicated in hundreds of studies (Sanfey et al., 2009). In a recent and detailed review for most influential studies using the ultimatum game, Camerer (2003) reported the common offers provided by the proposers and the rejection rates of the responders. Proposers usually offer 30 to 40 percent of the stake size with the modal and median being 40 to 50 percent. The

proposers rarely offered above 51% and below 10 percent of the stake size. Responders, on the other hand, rejected offers below 20 percent of the stake size about half the time and accepted the majority of offers that are in the 40 to 50 percent.

From an evolutionary perspective, it is imperative that people who are unwilling to cooperate, so-called “free riders”, are reprimanded and thereby suffer the consequences of their uncooperativeness (Wischniewski et al., 2009). When making decisions, individuals take into account social factors, such as fairness (Lee, 2008). These social factors direct behavior into a pattern that minimizes monetary self-interest. In general, individuals feel uncomfortable dealing with “free riders” and experience happiness when they can punish such behaviors (Krebs, 2008). The “free-rider” phenomenon is the explanation behind any behavior in bargaining games.

As mentioned earlier, the clear findings in the ultimatum game support the tendency for responders to reject low offers from proposers. Responders are not only concerned with their pay off, evidence from various studies indicate that they tend to compare their payoff with that of the proposer (Guth & Kochner, 2013). Such rejection of monetary reward is negatively correlated with the magnitude of the offer.

It is assumed that if the proposers were not cooperative, that is, did not propose an equal share of the money, they will be flagged as “free riders” (Krebs, 2008). Being categorized as a rebel against group rules may provoke a reprimanding response from others. When the responders believe they are being treated unfairly in the ultimatum game, they punish the proposers by rejecting their offers, resulting in the proposers losing their share of the money. This indicates that responders gain more out of punishing the proposer for an unfair offer than they do by accepting the offer (Boskem & De Cremer, 2010; Guth et al., 1983; Polezzi et al., 2008). In support of these findings,

Boksem and De Cremer (2010) found that individuals who scored high on morality also showed greater rates of rejection of unfair offers compared to individuals who scored low on morality.

### **Research in Ultimatum Game**

Psychologists adopted the ultimatum game in order to study bargaining behavior, manipulating any factor that might be a potential variable. Variables such as stake size, anonymity of players, and repetition of trials are considered methodological factors. Demographic variables measure how individuals with different backgrounds respond in the ultimatum game. The effects of varying these two kinds of variables are briefly discussed.

**Repetition.** Researchers repeated the one-shot ultimatum game to study whether this would affect the way the participants played. The findings were controversial. Bolton and Zwick (1995) did not observe any effect, while Roth et al. (1991) and List and Cherry (2000) showed a trend for proposed offers and rejection rates to decrease over time. Alternatively Cramerer (2003) claimed that experience in the ultimatum game only had a small effect on lowering rejection rates.

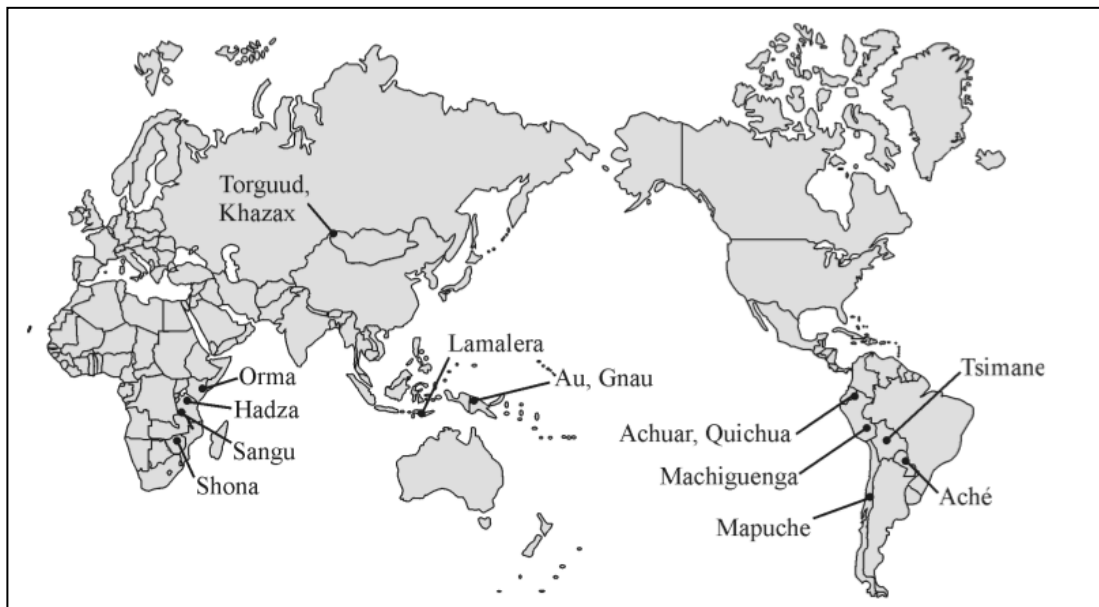
**Stake size.** Economists believed that raising the stake size would drive proposers and responders to act according to self-interest rather than based on fairness concerns (Cramerer, 2003). The assumption is that as the stakes become higher, the responder's payoffs become more significant than the proposer's payoff. They assumed, for instance, that responders are more likely to reject 10 percent out of \$10 than out of \$50. Many studies did not support this prediction. Researchers tested rejection rates for different stake sizes, some as high as a three months' income (Cameron, 1999; Fehr, Tougareve & Fichberacher, 2013).

Again, the findings were not consistent across different studies. Some findings reported no significant differences in rejection rates between high and low stake sizes (List & Cherry, 2000; Carpenter et al., 2005; Kochner et al. 2008). Other results showed a small increase in rejection rates for high stake size offers compared to low stake size ones (Cameron, 1999; Fehr, Tougareva & Fichbacher, 2013; Van der Veen & Sahibdin, 2011). This implies that fairness was more important to the responders when the stake size was high. Several unknown factors led to different behavioral outcomes in these studies. Cramerer (2003) and Diekmann (2004) reviewed the findings from various studies and concluded that high stakes cause a modest increase in altruistic behavior, which is not observed in low stake size situations.

**Culture.** A handful of studies tested the impact of cultural differences on the outcome of the ultimatum game (Oosternbeek, Sloof & Van de Kuilen, 2004; Henrich, 2000; Henrich et al., 2001, Chuah et al. 2007; Chen & Tang, 2009; Rosenbaum et al., 2012). However, cross-cultural comparisons in the ultimatum game have been quite unsystematic (Guth & Kochner, 2013). Results from cross-cultural research (Henrich et al., 2005) and meta-analysis (Oosternbeek et al., 2004) are presented below. Limitations of the current studies are also briefly discussed.

Henrich et al. (2005) conducted a large cross-cultural study, recruiting participants from 15 small-scale societies in 12 countries. Figure 1 illustrates the 15 different societies. The results showed that, none of the individuals societies had its' individuals played the ultimatum game solely based on self-interest. In addition, local importance of cooperation predicted the behavioral outcome between different societies. Finally, on the individual-level responder's age, gender and relative wealth did not affect rejection rates across and within-groups.

Individuals from different societies also varied on how they played the ultimatum game. Responder's rejection rates were not consistent across societies. In some groups, rejecting offers was extremely rare, regardless of the offers were being or low. In Kazakh, Quichua, Ache and Tsimani, for instance, the rejection rates were zero out of 10, 14, 51 and 70 offers, respectively. In other societies, such as the Au and the Gnau of Papua New Guinea, offers below and above 50% of the stake size were rejected with almost similar frequency. Henrich et al. (2005) show the variability in behaviors across traditional cultures in rural areas. However, it cannot be generalized to other cultures.



*Figure 1: Locations of the 15 small-scale societies based on Henrich et al. (2005).*

Oosterbeek et al. (2004) gathered findings from 37 papers with 75 results from ultimatum game experiments conducted in 25 different countries. The meta-analysis revealed that, on average, proposers offer 40% of the stake size. In addition, responders rejected, on average, any offer less than 16% of the stake size. These results replicate Guth et al. (1983) findings across different regions.

They also searched for the relationships between behavioral differences in social decision tasks across cultures. The data from the 37 articles were presented across regions rather than across countries. The regions were the following: Africa (Kenya, Tanzania, Zimbabwe), Asia (Indonesia, Japan, Mongolia, Papua New Guinea), Eastern Europe (Romania, Slovakia, Yugoslavia), Western Europe (Austria, France, Germany, Netherlands, Spain, Sweden, United Kingdom), Israel, South America (Bolivia, Chile, Ecuador, Honduras, Paraguay, Peru), Eastern states in the US, and Western states in the US. Results showed that there are no significant differences in the size offer between regions. However, the responders' rejection rates were only significantly different in these regions: Asia and Western states in the US, and between Eastern and Western states in the US. Asian responders have significantly higher rejection rates compared to responders in the US. Likewise, responders from Eastern states had a higher rejection rate than those from the Western states. The authors argue that these results do not correspond to cultural differences.

Cramerer (2003) mentioned important methodological difficulties that researchers faced during cross-cultural research on the ultimatum game. To start with, a methodological difficulty would be to avoid biases due to experimenter's effect. For instance, Henrich et al. (2005) conducted the study across 15 different societies where different experimenters administered the study for the different samples. The significant findings might be due to experimenter bias across samples, and not because of a genuine cross-cultural difference.

A third challenge that Cramerer (2003) presented was avoiding the effects of confounding variables in cross-cultural research. For example, having significantly different outcomes in the ultimatum game for university students in two different

countries might not indicate cultural differences. University students in one country may be older than those in the other country, due to pre-college army service. Hence, that could account for the difference.

Another important methodological factor is the stake size. There are differences in the purchasing power of the stake size in different cultures, which lead to incomparable cross-cultural results. In Lamalera, Indonesia, Henrich et al. (2005) had to switch the stake from cash to a pack of cigarettes so that the locals do not view the game as gambling. In that society, individuals can easily exchange a pack of cigarettes for money or food. The use of different kinds of stakes may potentially hinder the comparison of results.

**Gender.** There is conflicting evidence as to whether there are gender differences in the ultimatum game. Eckel and Grossman (2001) showed that females gave higher proposals than males, regardless of the gender of the responders. In addition, offers from females had a higher acceptance rate, a phenomenon the authors termed chivalry. Sutter et al. (2009) also tested the effects of gender and gender interaction on the outcome of this game. They found that there was no significant effect between genders, supporting Eckel and Grossman's (2001) results. However, pairing the proposers and responders based on gender changed the proposed offer and rejection rate of the offer. Specifically, when individuals of the same gender were paired together, the proposers tended to offer less, whereas the responders' rejection rates were higher.

Other research compared gender differences and found contradictory results. Saad and Grill (2001) found that males were more generous in their proposals to females compared to other males. Females, however, did not show a significant difference between proposing to another female or to a male. Solnick (2001) found that

females tend to get lower offers, and that the minimum accepted offer was greater when both genders play with female proposers.

Garcia-Gallego, Georagantzis and Gutierrez (2013) conducted a cross-cultural study using the ultimatum game with participants from Greece, Spain and the UK. They found that the behavioral differences across cultures could be largely explained by gender norms. For instance, males accept more offers than females in the Greek and Spanish cultures while females accept more offers than males in the UK. The authors concluded that gender resulted in cultural differences.

**Other demographic factors.** Several other demographic variables, such as race, academic major and age, have been shown to affect how individuals play the ultimatum game. Eckel and Grossman (2001) found that race was an important factor in the outcome of the ultimatum game. African American students rejected more when playing as responders. The participants' major in universities also affected how they played the ultimatum game (Carter & Irons, 1991). Despite the inconsistent nature of these research results, compared to students from other majors, those who were majoring in economics demanded more from proposers. According to developmental studies, individuals of different ages respond differently in the ultimatum game (Harbaugh, Krause & Liday, 2003). Results from these studies shed light on the nature vs. nurture debate, and are generally not thought to have direct links with fairness concerns.

## CHAPTER IV



## NEUROLOGICAL STUDIES USING THE ULTIMATUM GAME

As an interactive task, the ultimatum game is used to examine neural correlates of social emotions and decision-making processes in the context of cooperation and altruistic punishment (Rilling, 2011). The majority of experiments ask participants to play as responders in this game. Therefore, the research presented here tackles the emotions that are behind rejecting offers with different degrees of fairness.

Various methods in neuroscience are used to model emotions elicited in this interactive task. Their methods are briefly explained. Then neurological studies that have used the ultimatum game to study social cognitions are presented. A model describing individuals' cognitive and emotional reactions to unfair behavior in the ultimatum game follows. After that the major function of the anterior cingulate cortex in ultimatum game is presented. The chapter concludes by discussing the added value of neuroscience to social psychology.

### **Neuroscience Methods**

The methods used in neuroscience to probe the neural bases of social decision-making include functional magnetic resonance imaging (fMRI), electroencephalogram (EEG), transcranial magnetic stimulation (TMS), the study of brain damage in neurological patients, as well as lesions in the brain. Each of these methods presents different kinds of evidence for social emotions and decision-making processes.

Each technique provides specific benefits while simultaneously having its own limitations. For example, the fMRI technique has high spatial resolution not found in EEG. However, EEG has a much higher temporal resolution but little spatial resolution. Results from both techniques are presented below. The neuroimaging (fMRI) studies

provide insight into the neural structures involved in playing the ultimatum game (Sanfey et al., 2003; Tabibnia et al., 2008). EEG studies illustrate online assessment of neurocognitive mechanisms during social decision-making (Boskem, De Cremer, 2010; Polezzi, et al., 2008).

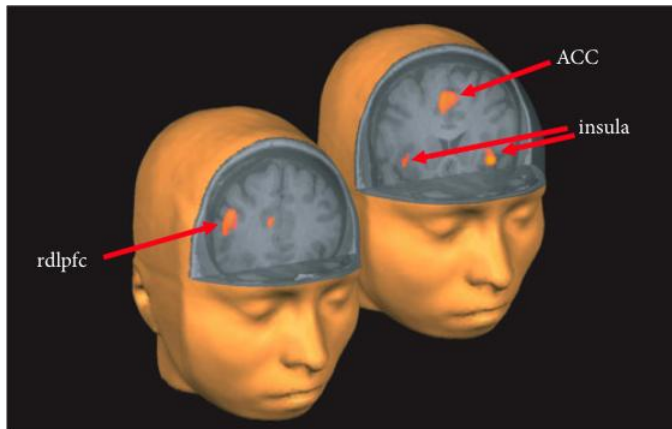
Transcranial magnetic stimulation (TMS) is used to generate electric current in the brain that enables temporary disruption of the cortical regions. It is usually useful to understand the function of a specific area in the brain in social cognition (Rilling & Sanfey, 2011). Patients with lesions generally present insightful knowledge on the role of the area in normal brain function. However, the limitation is that these lesions occur on a vast area of the brain and the symptoms vary with and across patients. This makes it difficult to specify which area is responsible for what behavior.

### **Ultimatum Game Tested Using Neurological Methods**

Sanfey et al. (2003) scanned the brains of responders using fMRI to detect brain areas that are active during decision-making process. They asked 19 participants to play as responders in the ultimatum game. Sanfey et al. (2003) manipulated the offers sizes in social and non-social interactions to test their effects on different cognitive and emotional processes. Participants were presented with 30 different offers, 10 from a human partner, 10 from a computer partner and 10 control rounds in which they receive money by only pressing a button. Researchers, in fact, predetermined all offers to ensure that all participants were given the same set of offers.

Results showed that receiving unfair offers was significantly associated with greater activation of three brain areas: bilateral anterior insula regions, dorsolateral prefrontal cortex (DLPC), and anterior cingulate cortex (ACC; Figure 2). There was greater activation of these areas for unfair offers while playing with human partners

compared with both playing with computers as partners, or receiving fair offers. This suggests that the amount of money offered to the participants did not solely result in the increased activation of these areas. The unfair offer from another human was the main factor that reflects increased activation. In addition, the greater the unfairness of the offer, the greater the activation in the bilateral anterior insula.



*Figure 2: Activated brain regions in response to receiving unfair offers in the ultimatum game (Rilling, 2011).*

Fair offers are always associated with higher material gain than unfair ones. So, it is plausible that a fair offer might be rewarding because of its monetary payoff. Thus, the emotional responses elicited by unfair offers in Sanfey et al.'s (2003) study can be either due to fairness concerns or material gains.

Tabibnia, Satpute, and Lieberman (2008) aimed at resolving this ambiguity between fairness and financial interest. Twelve participants played the ultimatum game. Acting as responders, they were given 28 offers (14 fair and 14 unfair offers) while being subjected to an fMRI scan. To control for monetary payoff, participants were given different stakes ranging from \$1 to \$30 so that a fair offer in one trial (e.g. \$0.5 out of \$1) is an unfair offer in another (e.g. \$0.5 out of 10). They hypothesized that if participants receive the same monetary value but in one case as a fair offer and in

another as an unfair offer, their emotional reactions should be different. Also, when treated fairly the rewards regions in the brain should be more active compared to baseline. These regions include the ventral striatum, amygdala, ventromedial prefrontal cortex (VMPFC), orbitofrontal cortex and midbrain dopamine regions.

Results showed that when the responders received a fair offer they reported feeling happy regardless of the material gain. In addition, results from the fMRI illustrated the responsiveness of the same areas that make up the reward circuitry to fair offers. The areas include the ventral striatum, amygdala and VMPFC. This suggests that there is responsiveness to fair offers that elicits a pleasant experience. Furthermore, these brain regions are associated with automatic processes (Lieberman, 2007). Hence, the positive experience elicited by being treated fairly is relatively intuitive.

### **Model Describing Brain Activations during Unfair Offers**

Sanfey et al. (2003) described a model that explains the motivations behind accepting or rejecting unfair offers. Previous research in cognitive neuroscience associated each of the above brain regions with a separate function. Comparing their known functions with the results presented above shed light on their roles in responding to unfairness. Mainly, the roles of the anterior insula and DLPFC are discussed in this section.

**Anterior insula.** The anterior insula is part of the emotional processing system in the brain (Singer et al., 2004). It is readily activated by feelings of disgust (Calder, Lawrence, & Young, 2001), sadness and anger (Damasio, 2003) and aversive bodily states (Critchley et al., 2000). This also suggests that the anterior insula is part of a neural system that responds to aversive stimuli. As mentioned earlier, the anterior insula is responsive to unfair offers from proposers. Sanfey et al. (2003) proposed that anger

and disgust emotions are represented in the activation of anterior insula in response to unfair offers. If the activation of this brain region reflects the participant's negative emotions towards unfair offers, there should be a correlation between rejection rates and the activity in this region. Sanfey et al. (2003) showed that participants with stronger anterior insula activation to unfair offers had higher rejection rates of unfair offers. These results support the hypothesis that neural representations in emotions have a function in decision-making.

**Dorsolateral prefrontal cortex.** As mentioned earlier, there is an increase in activation in DLPFC during the presentation of unfair offers (Sanfey et al., 2003). This increase does not vary according to the degree of unfairness. Knoch et al. (2006) disrupted the activation of this area using repetitive transcranial magnetic stimulation (rTMS) and reported an increase in acceptance rates for unfair offers. Interestingly, this disruption in the DLPFC did not have an impact on retrospective fairness judgments. DLPFC is not the sole brain area that can predict behavior because the correlation between its activation and the rejection rates is not significant.

The DLPFC is known to be involved in goal maintenance (Miller & Cohen, 2001) and executive functioning (Wagner, Maril, Bjork, & Schacter, 2001). It is responsible for actively maintaining the goal of the task at hand. Sanfey et al. (2003) proposed that, in the ultimatum game, the goal is to collect as much money as possible. Thus, this increase in activation of the DLPFC during unfair offers is not indicative of negative emotion in a social situation. Instead the increased activation is due to the use of more cognitive demands in order to stay focused on the goal, which is maximizing profit. Based on results of the rejection rates of very unfair offers, it is expected that the participants would find it harder to accept the money. These results suggest that the

DLPFC inhibits selfish behavior that is not in line with the fairness concerns (Fehr & Schmidt, 1999; van't Wout et al., 2005).

**Interaction between insula, DLPFC and ACC.** The decision taken in the ultimatum game has been shown to be a result of reason (Guth et al., 1983) as well as emotion (Tabibnia et al., 2008). Thus, it is expected that both cognition and emotion should determine whether responders accept or reject offers. A model was proposed based on the previously mentioned results from fMRI and EEG studies (Sanfey et al., 2003; Rilling, 2011). The activation of ACC in this task represents the conflict between two opposite motives that are elicited by unfair offers. The first motive is the outcome of the activation of the anterior insula. This area activates in response to an emotional resentment of unfair offers. This emotion drives the responders to reject the unfair offers. The second motive is the result of the activation of the DLPFC. This region advocates the rational goal of maximizing momentary payoffs. Thus, the DLPFC activation promotes the acceptance of unfair offers.

### **Basic Functions of ACC**

Sanfey et al. (2003) interpreted these results solely in terms of reflecting the conflict between the rational and emotional responses to unfair offers. The model presented before fails to include previous evidence regarding the function of ACC. As mentioned earlier, fMRI studies detect increased activation in the ACC for unfair offers. Neuroscience research presents evidence linking ACC to the experience of pain and to situations with unpredictable outcomes. Both functions of ACC are presented in this section.

**Physical and social pain.** Evidence suggests that the ACC is also associated with affectively distressing components of physical and social pain (Eisenberger &

Lieberman, 2004). Physical pain is defined as distressing sensory or emotional feeling corresponding to tissue damage. Social pain is defined as an unpleasant feeling experienced as a result of being socially excluded from a social group or distanced from close others.

Eisenberger, Lieberman and Williams (2003) asked participants to play virtual ball-tossing game in which they were excluded. Their brains were scanned using fMRI while they were playing. Results showed that when individuals experience social exclusion, the ACC activates. The activity of ACC is also positively correlated with self-reported distress. Eisenberger and Lieberman (2004) argued that it is not a coincidence that people say they have 'broken hearts'. The common neural system for social and physical pain explains the language overlap. Similarly, in the ultimatum game, whenever responders receive an unfair offer, they experience social pain. This is elicited by the activation of the ACC.

**Reward prediction error.** Additional research pointed towards the ACC's involvement in processing of outcomes that diverge from expectations. For instance, Amiez, Joseph and Procyk (2005) gathered evidence supporting the involvement of ACC in the processing of disappointed expectations. When individuals commit errors, there is a significant increase in the activity of the ACC (Ullsperger, Nittono, & Von Cramon, 2007). Nieuwenhuis et al. (2007) showed an increase in activation of the ACC when the feedback of the participant's performance was below expectations. Holroyd and Coles (2002) suggest that the activity in ACC represents having an outcome that fails to live up to expectations (reward prediction error).

Gehring and Willoughby (2002) showed that a group of negative-going, event-related potentials (ERPs) originating from the ACC resulted from reward prediction

errors. The two main components of this signal are the feedback-related negativity (FRN) and the error-related negativity (ERN). Whereas FRN is elicited when an individual commits error, the ERN is a result of receiving negative performance feedback. This class of negative-going ERPs is known as medial frontal negativity (MFN) (Gehring & Willoughby, 2002).

Boksem et al. (2008) suggest that this event-related potential reflects emotional evaluation of unexpected outcomes. Accordingly, it is hypothesized that in the ultimatum game, when the responders are presented with an unfair offer, they experience a discrepancy between the expected outcome – fair offer – and the actual outcome - unfair offer. This might be the reason behind the increased activation in ACC in unfair offers as compared to fair ones. Thus, the MFN amplitude elicited by unfair offers would be greater for those who score high on morality.

Polezzi et al. (2008) asked 13 participants to play as responders in the ultimatum game while having the EEG record their brain activity. The researchers noted that fair offers (40 – 50% of the stake size) and very unfair offers (less than 20% of the stake size) were extensively tested. However, there is no data that describes individual's responses on moderately unfair offers (any offer between the two). They hypothesized that these kinds of offers will have longer latencies and will be rejected 50% of the times. In their experiment they asked the participants to respond to 3 different kinds of conditions, fair, moderately unfair and very unfair, which were repeated several times. Again, the researchers increase ecological validity of the study by informing the participants that the proposers who they would play with were located in a second laboratory. The participants had to accept or reject 200 trials.



Behavioral results were not surprising for the fair and very unfair offers. For the moderately unfair offer (or what they called mid-value offers) the acceptance rate was 48%, as expected. The acceptance rate was significantly different for the three types of offer. Acceptance rate of mid-value offers was not significantly different from random. The only significant difference in reaction times was between fair and mid-value offers. The participants took longer to respond to mid-value offers compared to fair offers. The authors explained that participants had a clearly defined action plan in fair and very unfair offer. However, mid-value offers require more elaborate processes to reach a decision.

On the electrophysiological level, Polezzi et al. (2008) tested the variation in processing offers as reflected in FRN. This negative potential peak reflected the differences between fair offers on the one hand, and mid-value and unfair offers on the other. FRN had higher amplitude for mid-fair and unfair offers. Larger amplitude of FRN has been associated with stronger ACC activity (Holroyd & Coles, 2002).

The results also showed a significant difference on the event-related potential N350. N350 was significantly greater for mid-value offers compared to fair and unfair offers. N350 is a negative potential that peaks at 350ms with the highest over frontal electrodes (Schendan & Kutas, 2003). Schendan and Kutas (2003) showed that N350 reflects unusual perspectives in an object recognition task. Given this study's findings and previous knowledge about N350, researchers deduced that mid-value offers tend to produce conflicting motivations that are elicited in this event-related potential.

Boksem and De Cremer (2010) asked 17 participants to play the ultimatum game while under the EEG. They were also asked to fill out the Moral Identity measure developed by Aquino and Reed (2002). Participants received 24 predetermined offers in

a fixed random order from 12 male and 12 female proposers. To increase the credibility of the study, the participants were told that the offers that were presented were from subjects who previously participated as proposers in the experiment. They were led to believe that these proposers would be paid according to the decisions done by the participants.

ERP results showed that MFN amplitude was most marked during unfair offers. This implies that MFN reflects negative social outcome. Another groundbreaking finding was the significant correlation between the component MFN and the scores on morality measure. Participants who scored higher on Moral Identity measures displayed pronounced MFN elicited by unfair offers. These results suggest that participants who value morality norms exhibited larger MFN when presented with unfair offers compared to participants with regard of such norms.

Van der Veen and Sahibdin (2011) also examined fairness in the ultimatum game and recorded brain activity using EEG. Their results were similar to those of Boksem and De Cremer (2010) reporting MFN during the reception of highly unfair offers. The researchers concluded that the MFN is also triggered by fairness considerations. This conclusion was supported still further by a handful of other experiments (Bohet & Zeckhauser, 2004; Boskem & De Cremer, 2010; Sanfey et al., 2003; Van der Veen & Sahibdin, 2011).

## CHAPTER V

### INTERGROUP INTERACTION IN THE ULTIMATUM GAME

In this chapter, research on the ultimatum game where the participants play under different intergroup interactions is studied. More so, studies that utilized EEG to test for reflection of implicit attitudes are presented later.

People tend to favor those who belong to their same group (Hewstone, Rubin & Willis, 2002). However, to what extent is unfair behavior tolerated from those who belong to the ingroup? Several researches in social psychology point to norm violation behavior. These studies state that for an ingroup member, norm-violation behavior is more likely to be punished than for an outgroup member (Balliet & Van Lange, 2013). This finding is specific to the behaviors that are regarded as extremely unfair. On the other hand, when it comes to behaviors that marginally violate the norm ingroup members are treated in a favorable manner.

Mendoza, Lane and Amodio (2014) aimed to test if ingroup members who act unfairly would be treated harshly or in a favorable manner. They first used race to define ingroup membership. They asked participants to play as responders in the ultimatum game. Initial findings showed that fairness concerns drove the rejection of unfair offers. Only in marginally unfair offers (where the offer was \$8 out of \$20) was the group membership a factor that led to rejection. Participants rejected these offers significantly more when they came from an ingroup member than from an outgroup member. To generalize the results to other group identities, they used college affiliation to define group membership. Results were similar

Mendoza et al. (2014) conducted a third follow up study to pinpoint the emotion behind rejection of unfair offers. They found that participants expected a more generous offer from their ingroup members than from outgroup members. Hence, the higher rejection rates of marginally unfair offers from ingroup members were mainly driven by

fairness perceptions. In other words, people invest more in reinforcing the treatment of ingroup favoritism. This drives responders to reject more offers from ingroup members that are expected to act in favor of ingroup members.

Mendoza et al.'s (2014) study provides insight to the prevalence of ingroup favoritism in the ultimatum game. It points out to a novel explanation of why marginally unfair offers are rejected even when the offer comes from ingroup members.

Mendoza et al. (2014) provided evidence that individuals promote ingroup favoritism which drives them to reject more unfair offers from ingroup members. However, in our study, proposers did not know the sect of the responder. Participants will not expect proposers to offer more for ingroup members. Hence, we did not expect them to reject more unfair offers from ingroup members.

As established before, several factors come into play to modify individual's response in the ultimatum game. It remained unclear whether intergroup interactions implicitly alter decisions on the expense of monetary gain. In 2013, Kubota et al. answered this question by conducting an experiment. In a study, they asked 49 participants to play the ultimatum game under different intergroup interactions. The authors expected that an unfair offer would be perceived as low when coming from someone of a different race as compared to that coming from the same race. They also tested participants' implicit attitudes via implicit association test (IAT).

Results from Kubota et al.'s (2013) study showed that the proposers' race did affect the responders' responses to unfair offers. Interestingly, offers from white proposers were accepted significantly more often than black proposers, irrespective of the race of the responder. More so, the participants were more sensitive to changes in offer size that came from black proposers. The intergroup discrimination was also

shown in response latency of the different offers. Participants were quicker in deciding whether to accept or reject offers from black proposers than from white proposers. Last but not least, the researchers found that implicit racial bias did in fact predict the responses on the ultimatum game. People who scored higher on implicit racial bias rejected more offers from black compared to white proposers.

It is noteworthy that the data from white and other-race (non black) participants did not show any significant differences. Based on that, the authors explained the results as the outcome of stereotypes and prejudice association with black people. This study gives a good insight into interracial bias and its effect on economical decision-making. However, this study had major limitations. The sample was not representative. Moreover, the statistical power was low and as such other results could not be stated without some doubt about the reliability of the statistical analysis. In a nutshell, their racial interactions did alter the decision making process and was based upon the implicit racial biases that participants held. Nevertheless, it remains vague how the decisions are altered since the different racial groups in the sample were not matched to derive conclusions based on comparisons.

### **Neurological Studies**

Wang, Tang and Deng (2014) questioned the extent to which behavior biases based on ingroup favoritism could be reflected in neurophysiological responses. The authors tested whether people's distributive justice can be impacted by intergroup interactions. They speculated that distributive justice would be influenced by ingroup favoritism and possibly indicated by P300 and LPP components. They recruited 21 participants to conduct a distributive task (120 trials) while recording their brain activity. Each trial required the participants to choose to provide a meal to either two

children who belonged to the same racial group or to only one child who belonged to another racial group.

Participants' behavioral results were in line with ingroup favoritism. In other words, during decision-making, participants preferred to support their ingroup members. Ingroup favoritism was also reflected in the electrophysiological results. Both P300 and LPP showed a greater positivity when participants' ingroup members were at a disadvantage. The authors interpreted these results in the following way. In situations where there was a conflict between fair distributions and favoring ingroup members more attentional recourses or cognitive efforts are required. These are reflected through increased positivity in P300 and LPP event-related potentials.

Social comparison is also influenced by individual's fairness concerns. Wu et al. (2011) wanted to support this statement on an electrophysiological level. They hypothesized that in different social comparisons fairness concerns differ. They asked 26 participants to play the ultimatum game as their brain activity was recorded using EEG. The participants took the role of responders and were given moderately unfair offers and highly unequal offers. They were also exposed to three different social comparisons. The participants were led to believe that the average amount of offers to responders were more, less or equal to that provided to them. These resemble upward, downward and lateral comparisons, respectively. The aim of the study was therefore to different social comparisons changes fairness concerns and how event related potentials reflects these changes. MFN reflects violations of social expectancy (Boksem & De Cremer, 2010). Hence, Wu et al. (2011) speculated that MFN would be regulated during different fair offers as shown by Boksem and De Cremer (2010). In addition, it was speculated that when the participants receive an offer that is less than the average

provided offer, the violations would be greater. Thus, Wu et al. (2011) suspected that the elicited MFN would be greater when participants undergo upward comparisons. P300 and LPP were also studied.

Behavioral results showed a significant interaction between social comparison and type of offer. What was relevant to our argument was the following finding. The rate of rejection of the offer was less for moderately unfair offers in the upward condition than the moderately unfair offers in the lateral condition. This was also the case for highly unequal offers. Thus, as predicted, the social comparisons did have an effect on fairness concerns on the behavioral level.

Electrophysiologically, MFN, P300 and LPP were explored across the different conditions. Boksem and De Cremer's (2010) results were replicated for fairness concerns. The highly unfair offers elicited more MFN than moderately unfair offers. However, contrary to what was expected this effect was not modulated by the social comparison. The different social comparisons were reflected in LPP only. LPP was more prominent in the downward comparison for moderately unfair offers compared to highly unfair offers. Results did not show differences in P300 across elicited differently in the various social comparisons.

## CHAPTER VI

### AIM OF THE STUDY

Harb (2010) established that Lebanese youth report to have biases toward their own sect. In other words, Lebanese youth claim to have ingroup favoritism. Research often describes several facets of intergroup interactions, only one of which is the explicitly reported attitude. Another facet is the implicit attitudes that are driven

automatically. These attitudes might give rise to discriminatory behaviors. The interaction of these variables is crucial to help understand ingroup favoritism and its consequences. The purpose of this study is to integrate several techniques from social psychology and neuroscience to help describe sectarianism and its effect on behavior. In the current study, we examine implicit attitudes, explicit attitudes and discriminatory behavior.

Implicit attitudes are reflected in ERP. Specific components have been linked to different aspects of ingroup favoritism. Wang et al. (2014) showed that the LPP and P300 are elicited when an ingroup member is treated unfairly. However, other research shows that P300 reflects several cognitive processes including decision-making (Picton, 2000; Freeman & Quiroga, 2013). Since this study involves decision-making, we expect P300 to be elicited after the stimulus. However, P300 is not assumed to be significantly different across groups.

Ito and Bartholow (2009) showed that MFN was reflected only when individuals were motivated to control their racial biases. In 2011, Wu and colleagues conducted an experiment to show which of the MFN, P300 and LPP reflect social comparisons. Findings show that LPP is the only event related potential that reflected social comparisons. Hence, in our study we only expect LPP to reflect ingroup favoritism. In this study, electrophysiological activity is recorded and three event-related potentials are explored: MFN, P300 and LPP.

Explicit attitudes are usually tested using self-report measures such as surveys. Ito, Thompson and Cacioppo (2004) and Payne (2001) tested explicit racial attitudes using the Modern Racism Scale. The sectarianism scale developed by Harb (2010) is a good measure of ingroup favoritism in this situation. This scale has good reliability and



is tailored to test for sectarianism in Lebanon. Moreover, it was previously used with Lebanese youth, which is the sample used in this study.

The current study also aims to quantify behavior and test for ingroup favoritism. We used a widely accepted decision-making task, the ultimatum game. The ultimatum game is a tool to study human responses to a social situation. It enables a one-time interaction with a stranger. Hence, the effect of future consequences can be controlled for. Fairness of the offer is one of the variables that affects the responder's behavior. In this study, we asked participants to play as responders so that the fairness of the offer could be manipulated and controlled for. It is imperative to control for the general fairness concerns of individuals in the ultimatum game. In fact, Boskem and De Cremer (2010) showed that fairness concerns were significantly correlated with rejection rates of unfair offers. Using the Moral Identity instrument developed by Aquino and Reed (2002), we decreased the variability of naturally occurring differences among participants on that attitude.

Manipulation of the intergroup dynamics using a fairness criterion (money) will allow us to see whether behavior differs during intergroup interactions. In other words, acceptance and rejection rates in the ultimatum game assess actual behaviors while the sectarianism scale (Harb, 2010) examines self-declared sectarian attitudes. Only by comparing the two can we study the degree of consistency between explicit prejudicial attitudes displayed in self-report questionnaire, implicit attitudes and discriminatory behavior.

The ultimatum game has been tested across various cultures (Henrich, 2001; Oosterbeek et al. 2004). Although rejection rates varied in different societies, there still is no clear evidence regarding how they varied. Cross-cultural comparisons were indeed

significant, but these differences do not seem to correspond to cultural differences (Henrich, et al. 2001; Oosterbeek et al. 2004). This inconsistency begs for more research in the field. Even so, there is a trend to reject unfair offers and accept fair ones (Oosterbeek et al. 2004).

In some studies, the gender of the proposer and/or responder had an effect on rejection rates (Eckel & Grossman, 2001; Sutter et al., 2009). The gender of the proposer was not communicated to the participant so that gender effects could be controlled for in the ultimatum game. In addition, to avoid any differences of gender on rejection rates based on social interaction, participants were randomly assigned to different groups.

Some research showed that the addition of several trials to the ultimatum game has no effect on rejection rates (Bolton & Zwick, 1995). Others found a small effect of repetition on lowering rejection rates (Cramerer, 2003). Given that studies rarely ask the participants to play only once, we included several trials in our experiment. For example, Polezzi et al. (2008) asked the participants to undergo 200 trials of the ultimatum game. Rilling (2011) raised concern about the ecological validity of studies that examine social interactions using neurological methods. To avoid this problem, we asked the participants to respond only to 6 different numbers of trials. Although this decreased the power of the behavioral results, it increased the ecological validity of the experiment.

The stake size in the ultimatum game does not affect the rejection rates of offers (Cramerer, 2003; Cameron, 1999; Fehr, Tougareve & Ficheracher, 2013). Hence, we decided to use \$40 as stake size in this experiment. Offers between 40% and 50% of the stake size are considered fair (Guth et al. 1983). Offers equal or less than 20% have high

rejection rates and are thus considered very unfair. Mid-value offers are neither fair nor very unfair. While a handful of research (Knoch et al., 2006; Sanfey et al., 2003) combines moderately unfair offers with very unfair offers, Polezzi et al. (2008) found a significant difference between them. The moderately unfair offers were accepted randomly. In this study, we gave the participants three kinds of offers: fair, moderately unfair and very unfair. We expected that only in the moderately unfair offer would there be a higher degree of uncertainty. The behavioral results might then reflect rejection rates that would be different from fair and very unfair offers. In addition, there might be a platform to react to implicit attitudes and accept more offers from ingroup members.

Subjects in the current study were required to play the ultimatum game while event-related potentials are recorded. Event-related potentials between the 270 and 360 milli-second time window are the established frame to distinguish medial frontal negativity (MFN) amplitudes coming from fair and unfair offers (Bohet & Zeckhauser, 2004; Boskem & De Cremer, 2010; Sanfey et al., 2003; Van der Veen & Sahibdin, 2011). MFN is an evoked potential that is elicited by unexpected outcomes (Gehring & Willoughby, 2002). It originates from the anterior cingulate cortex – an area reflecting social pain and reward prediction error. In this study, we tested for this event-related potential. Based on what previous studies showed, we expected that MFN would be more elicited in both moderately and very unfair offers compared to fair offers. Polezzi et al. (2008) did not find any significant difference between moderately unfair and very unfair offers on feedback-related negativity – a component of MFN.

The following sets of hypotheses are proposed:

### **Electrophysiological results**

*Hypothesis 1: There will be more frontal negativity when a moderately unfair offer comes from a proposer belonging to a different sect compared to an unfair offer that comes from a proposer belonging to the same sect.*

*Hypothesis 2: There will be significantly more late positive potential when the participant gets a fair offer from a proposer belonging to the same sect than a fair offer from a proposer belonging to a different sect.*

*Hypothesis 3: For fair offers, the frontal negativity will be significantly lower than unfair offers.*

*Hypothesis 4: The MFN will show no significant difference for sect controlling for fairness of the offer.*

*Hypothesis 5: P300 will show in all fair and unfair offers.*

*Hypothesis 6: Controlling for group interactions, LPP will not be significantly different for fair and unfair offers.*

### **Behavioral results**

*Hypothesis 7: When morality and explicit sectarian attitudes are controlled for, moderately unfair offers proposed by a person from the same sect will be rejected significantly less often than moderately unfair offers of a person from a different sect or of a person from the control group.*

*Hypothesis 8: Scoring high or low on the sectarianism scale will correlate with the rate of rejection, respectively, of moderately unfair offers coming from proposers of a different sect.*

*Hypothesis 9: Participants will significantly accept fair offers more than unfair offers.*

## **CHAPTER VII**

## METHOD

### Research Design

This study is a 3x3 mixed experimental design. The first factor is the fairness of the offers in the ultimatum game. All of the participants played as responders and were asked to take decisions regarding six different offers. All offers came from the same source and ranged from being fair to strongly unfair.

The second factor was group interaction. There were three types of interactions. One was an intergroup type of interaction, another was an intra-group interaction, and one was characterized by the absence of group identity (i.e. control group). Subjects were randomly assigned to these three groups. Each group contained fifteen participants, making a total of 45 participants for this experiment. This independent variable was manipulated between participants.

Table 1

Number of Participants in 3x3 mixed design

Group	Kind of offer		
	Fair	Moderately unfair	Strongly unfair
Control	15	15	15
Ingroup	15	15	15
Outgroup	15	15	15
Total	45	45	45

Three main dependent variables were explored. First, the brain activity was recorded. Based on the neuroscientific models and previous behavioral findings, three different event-related potentials were studied in this experiment: MFN, P300 and LPP.

Second, the acceptance and rejection of the offers under different social situations were analyzed. The final dependent variable was the responses to the sectarianism scale, which imply the explicit attitudes of the participants. The methods in which these three dependent variables were calculated are presented below along with the materials.

In this section, the materials are presented. First, we present the different measure utilized in this experiment. These include: general information questionnaire, handedness, sectarianism scale and Moral Identity Scale. Second, the types of offers presented in ultimatum game are illustrated. Third, the stimuli during the three different between group differences are described in details. Fourth, the electrophysiological recording and reduction used in this experiment are explained. Finally, we discuss ethical issues such as active deception, informed consent and the Institutional Board Review approval.

## **Materials**

**General information questionnaire.** This questionnaire included the following elements that assisted in the selection process: age, gender, the number of years lived in Lebanon and the participant's sect. In order to decrease face validity, the participants were also asked to fill in their major and some hobbies. Answers of these latter questions were disregarded. In addition, the questionnaire asked the participants to provide information about their visual acuity, a common factor used to control EEG variability (Picton et al., 2000).

Based on the response of this questionnaire, only some of the participants were selected to proceed to the data collection phase of the dependent variables. Participants were between 18 to 25 years old and had good visual acuity (with or without corrections). We wanted to avoid a high variability in EEG data. Also, our participants

had to be exposed to sectarianism. Thus, only those who lived in Lebanon for more than seven years were asked to complete the experiment. In 2005, the assignation of Prime Minister Rafik el Hariri was one of the events that sheltered Lebanon's party system (Haddad, 2013). Following on that note, we took seven years as a defining point of being exposed to sectarianism.

**Handedness questionnaire (Chapman & Chapman, 1987).** Measuring handedness was essential to minimize variations during EEG data collection (Picton et al., 2000). Chapman and Chapman's (1987) measurement of handedness contained thirteen items and was established by Raczkowski, Kalat and Nebes (1974). This scale had internal consistency (Cronbach's  $\alpha=.96$ ) and high test-retest reliability ( $r=.96$ ). One of the items on the scale, "On which shoulder do you rest a bat before swinging?", was disregarded because it did not seem culturally relevant. All other twelve items served to identify whether the participants were right-handed or left-handed. Handedness was also a key aspect that helped the selection process. In order to decrease variability we had to choose only right handed to complete the experiment.

**Sectarianism scale (Harb, 2010).** Harb's (2010) scale uses a five-point Likert-type scale ranging from 1 (extremely) to 5 (not at all) to rate attitudes towards other sects. Cronbach's alpha for the five items of the scale was good ( $\alpha=.85$ ). Therefore, the scale was a reliable measure of Lebanese youth's prejudiced attitudes toward one's own sect also referred to as ingroup favoritism.

**Moral identity scale (Aquino & Reed, 2002).** The Moral Identity instrument was a ten-item scale developed by Aquino and Reed (2002). It uses a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). It included two subscales: Symbolization (items 5 to 10) and Internalization (items 1 to 5), with a

Cronbach's alpha  $\alpha=.82$  and  $\alpha=.73$  respectively. The Symbolization subscale was an accurate predictor of self-presentational concerns and portrays the moral self whose actions are indicators of the existence of one's moral characteristics. The Internalization subscale, on the other hand, was a predictor of morally relevant behavior. It recorded the degree to which moral identity was a fundamental part of one's entity.

**Ultimatum game.** As mentioned earlier, the participants played the ultimatum game as proposes. Three kinds of offers were presented to participants: fair, moderately unfair, and strongly unfair offers. Each offer was repeated twice (two trials per offer). To increase the believability of the social interaction between the proposer and responder across the six trials, we also varied the moderately unfair and strongly unfair offers by adding or removing \$1. The percentage of offers was within the defined range of the kinds of offers; however, they were not duplicates, which made the alleged human interaction more credible.

The stake size in this particular experiment was 40 dollars. Hence, the fair offer given to the responders was twenty dollars, the moderately unfair offers were 12 or 13 dollars, and the strongly unfair offers were seven and eight dollars. Each participant had to accept or reject two fair, two unfair and two strongly unfair (Table 2).

Table 2

Six Different Offers Provided to the Participants

Number	Offer kind	Offer size	Percentage of stake size
1.	Fair	\$20	50%
2.	Moderately Unfair	\$12	30%
3.	Strongly Unfair	\$7	17.5%
4.	Fair	\$20	50%



5.	Moderately Unfair	\$13	32.5%
6.	Strongly Unfair	\$8	20%

*Note.* Stake size is \$40 for all.

After a detailed illustration of the ultimatum game was shown, all participants were given three practice trials. The participants were informed that they would play as responders and that the proposers previously participated in this experiment. The offers were in reality predetermined by the researchers and presented in a fixed random order for all participants.

The dependent variable was determined on a scale ranging from 0 to 2, depending on the number of trials rejected. If offers of the same type were accepted, the rejection rate was recorded as 0. If only one was rejected, then the rejection rate was recorded as 1. If both trials were rejected, then the rejection rate was recorded as 2. The higher the participants scored the greater the rejection rates on the different offers.

**Stimuli.** The stimulus was created and ran through the use of E-Prime software. The participants were first presented with their own profiles. Profiles for the in-group and out-group conditions included the name, sect, experiment [number], participant number, semester, session [number], and lab room number. For the control group, the same information was presented but with the sect excluded from the profile. The experimenter was then prompted to press enter if their description matched the one in the profile.

After getting acquainted with the ultimatum game with the practice trials, the participants were led to believe that the computer randomly matched them with someone who previously participated in this experiment. This was carried out via three consecutive slides that appear after the practice trials. The first slide presented that the

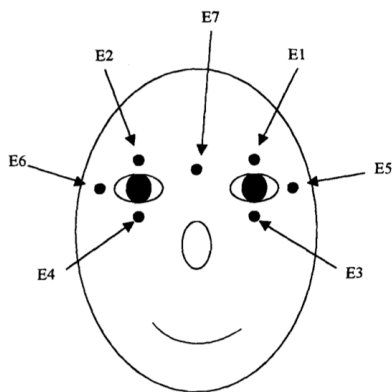
computer was randomly selecting a proposer. After that, a clock appeared giving the impression that the computer was undergoing the task of matching in the course of the session. This slide was shown for six seconds. The third slide presented the matched proposer.

When their match was found, the participants would see their profile was on the left and, while the profile of the person they should play with was on the right. The proposer's profile had the same information listed; however, the name, sect, semester were marked as "Hidden." After a couple of seconds, the computer showed a comparison between the two profiles, meaning that it gave either a "Match" or a "Mismatch" for sect, semester, experiment, session, and lab. The conditions, semester, experiment and session were always a "Match" and the lab was a "Mismatch". The only difference between the three groups was that of sect. In the control group, this information was not shared and so could not be used for comparison by the participants. However, in the in-group, the sect was presented as a "Match"; while in the out-group, the sect was presented as a "Mismatch." Appendix G is an example of the stimulus given for a participant in the out-group, where the sect of the proposer was not same as that for the responder/participant.

The participants were presented with six different trials. Each trial consisted of a 400ms pre-stimulus baseline period followed by this statement: "The Experimenter gave Player 14 \$40". This slide is presented for 5 seconds. After that, another slide appears explaining: "Player 14 offers you:". This slide stayed visible for 4 seconds. Then, the offer was presented in a time-framed slide for 4 seconds, during which, EEG analysis was conducted. Following this slide was when the participant was allowed to respond to the offer. The participant was asked to press S to accept the offer or press L

to reject it. Given that the EEG data was collected before the response, the participant had infinite time to respond. The responses were saved via E-prime software.

**Electrophysiological data collection and reduction.** . The cap was placed in accordance with to the 10-20 international system. The recordings were made on 32 electrodes mounted on an elastic cap. To control for ocular artifacts that can contaminate the EEG, horizontal and vertical electroculograms (EOGs) were recorded (Croft & Barry, 2000). For the horizontal EOGs, also known as HEOG, electrodes were placed on the right and left of the outer canthi of the eyes. In Figure 3, they are referred to as E5 and E6. The final HEOG signal was calculated from these two recordings. The vertical EOG was calculated from the difference between the neural potential above and below the left eye, placed in line with the pupil. In the figure below, they are referred to as E1 and E3. In order to further decrease eye movements and thus artifacts, participants were encouraged to use eyeglasses instead of lenses while performing the task.



*Figure 3.* Brunia et al., (1989) electrooculogram placement scheme

The data was recorded using the shielding mode option in the Pycoder program since the room was not fully insulated. Both the EEG and the EOG signals were sampled at a rate of 256 Hz, and a digitally low-pass filter was set at a 52 Hz cut-off (Boksem & De Cremer, 2010). The reference used was Pz; however, it was re-

referenced to an average mastoid reference later during analysis (offline re-referencing). The impedance was kept below 25kOhm to ensure reliable EEG recordings.

The EEG was continuously recorded during the stimulus presentation with markers allowing for ERP extractions. Each trial consisted of 200ms before presentation of the offer and 4s after the presentation. Epochs were then extracted between 260ms and 800ms for Fz, Pz and Cz. The dependent variables, MFN, LPP and P300, were calculated as follows. Data from 260ms to 360ms were compared to examine the P300 event-related potential. The time frame 375ms to 475ms was analyzed for possible MFN changes. The late event potential, LPP, is said to occur between 500 and 800ms, so the epochs in this time frame were also extracted.

### **Deception**

Active deception was used to obscure the real aim of the study and increase the credibility of the situation in which the participants were in. Not using active deception would have distorted the results and jeopardized the validity of the conclusions due to self-presentation biases and the adjustment of responses to the demand characteristics of the experiment. Active deception leads participants to focus on a fictitious target rather than monitor their responses to the variables that are actually of interest to the researchers.

In this experiment, volunteers who attended the first session were told that the selection of students to participate in the second session was done randomly. However, the process was dependent on their nationality, handedness and years they lived in Lebanon.

In addition, had participants been aware that the proposed offers in the ultimatum game were predetermined and not coming from an actual participant, their

responses would have been biased and not be a true reflection of their sectarian attitudes. As such, active deception was implemented in our experiment. The hypothetical situation – playing with someone from an outgroup– was necessary to actively engage students. Other less relevant alternatives would have likely created a detached feeling that would offset the research purpose and design.

By the end of the experiment, all participants were debriefed on the real aim of the study. The Institutional Board Review (IRB) at the American University of Beirut approved the experimental details.

### **Informed Consent**

Upon arrival to the first session, the participants were given an information sheet (Appendix A) to clarify the purpose of the study, which had not been fully disclosed up until then. The participants were told that the aim of the study was to identify brain and behavioral responses in decision-making. This sheet also explained the procedure of the experiment with the potential risks and benefits of this research study. Alternative procedures were given to the students as required by the IRB upon the use of the Psychology 101/201 pool. The sheet also reminded the students that they had the right to withdraw from the study at any point without any explanation and without any penalty. Students who did not want to participate in this study could either earn equivalent credit point by writing a brief report on an article from a psychological journal or by participating in another study. Personal identifiers (i.e. name and email) were collected from the participants; however, this information was kept confidential. The information sheet indicated that the participants would be chosen at random to complete the second part of the experiment. This was necessary so that the participants would not learn about the selection criteria.

Upon the completion of the data collection phase, the experimenter conducted a debriefing session to inform participants about the real purpose of the study, its benefits, and why the use of deception was absolutely necessary. The reasons behind the necessary use of deception were thoroughly explained. After explaining the study's rationale and the necessity of deception, participants were given the opportunity to direct any of their concerns or questions to the principal investigator. Participants had all of this also presented to them on the Debriefing form. IRB contact details were also added to this form in case participants had any other concerns. By signing it, participants had the opportunity to decide whether they want to include their data in the study (Appendix E). Participants were also informed that the data will be kept confidential to the fullest extent possible and all the information provided in reports could not be traced back to them. Raw data will be destroyed after seven years have elapsed.

### **Pilot Study**

Before the experiment was conducted, a pilot study took place using three participants. Each participant went through the three different between-group conditions. The pilot study also aimed to test the appropriateness of the instruments and the clarity of the instructions given during the experiment. In addition, the pilot gave an estimate on how long the experiment will take. This was also helpful in predicting and trying to prevent any problems that might arise during the experiment.

For instance, two out of three participants in the pilot study recognized the repetition of the two different offer types (moderately unfair and strongly unfair). Therefore, instead of showing the same kind of offer twice, we deducted a dollar from one of them. Instead of showing \$7 twice during the very unfair offer, we gave the

participant a \$7 offer once and an \$8 one the second time. The numbers were still in the range of strongly unfair offers; however, the process avoided the participants believing they are predetermined and not given by a real proposer.

We also had another observation based on the pilot study. The three participants seemed to be uncomfortable when presented with the EEG in the second session. In order to avoid that we decided to include in the first session ten minutes of brief explanation of the EEG procedure and to show the participants a sample of brain activity picked up by the EEG.

### **Procedure**

For recruitment, an advertisement was sent to the AUB Psychology 101/201 courses to start working on a subject pool for research purposes. The nature of the research was not fully explained. The advertisement merely mentioned that interested students should come for a first session to fill out a couple of questionnaires. Only some of those who attended were asked to complete the experiment. Those not asked to complete the experiment gained extra credit for Psychology 101/201 course by coming to the first session only. However, those asked to complete the second session as well received the same extra credit upon completing the experiment. The data collection took place during two academic semesters, Summer 2013 and Fall 2013.

**Session one.** The first session took place in the Psychology Lab in the Jesup Building, Room 107B, at the American University of Beirut. On average, it lasted about 10 minutes. Each of the 45 participants took this session alone. Upon the signing of the information sheet, participants received two questionnaires: the general information questionnaire and the handedness scale (Appendix B). The volunteers were then given a demonstration of an EEG set up and recording. The researcher informed the participants

that this technique would not put them at risk, health-wise. Only 45 participants, who were right-handed, had correct-to-normal vision and had lived in Lebanon for more than seven years, were asked to return for a second session.

**Session two.** Those eligible to complete the experiment were contacted by the experimenter and assigned to a schedule. Each of the forty-five participants carried out this session alone and at a different time. This session also took place in the Psychology Lab in 107B at Jesup, at the American University of Beirut and lasted for about 30 minutes on average. The participants were randomly assigned, through the use of a website called randomgenerator.org, to each of the three different groups: control, in-group and out-group.

The participants were first presented with a paper that asked them not to participate in this session had they taken recreational drugs or alcohol at any point in the past 24hrs (Appendix C). This was to ensure the validity of the EEG data collected according to Picton et al. (2000). They were then provided with their unique subject number and session number. The experimenter, assisted by two undergraduate students, fixed the EEG cap on the head of the participant.

The participants were told that the game had begun and were asked to minimize movement to get better EEG recording. The participants were provided with each of the six offers (presented above) separately and were instructed to either accept or reject them. This behavioral data was saved using E-Prime. Counterbalancing was not applicable in this setting since we did not have enough participants. After they were done playing the game, the EEG cap was removed from their heads, and they were given the sectarian questionnaire and the Moral Identity scale to fill out (Appendix D).



**Session three.** Upon the completion of the second session for all participants during each semester, the experimenter asked the participants to come to the debriefing session. The participants were given a debriefing form that contained the real aim of the study. The reason for the use of active deception was clarified. As mentioned earlier the participants had the opportunity to decide whether they want to include their data in the study, and they all agreed to the inclusion. A copy of the debriefing script was given for each participant to keep (Appendix E). Some of the participants presented concerns about how the results can be traced back to them. The experimenter assured them that the data collected was kept confidential that the reported data could not be traced to them.

### **Sample Characteristics**

Students were recruited from the Psychology 101/201 pool at the American University of Beirut. Given that the study was geared toward measuring the influence of sectarianism among Lebanese youths, all those who were not Lebanese were asked not to come to the second session. In addition, to decrease variability in EEG data, all participants had to be right-handed. Only forty-five students, who were Lebanese, right-handed, and above the age of eighteen, were asked to participate in the different experimental groups. Fifteen students were randomly assigned to each of the three groups (control, in-group and out-group).

The sample pool was made up of 27 females and 18 males. Only forty percent of the participants were males. Although we randomly assigned people to the different experimental groups, Table 3 shows that the most number of males were in the ingroup condition. Thus, the least number of females were also in the ingroup condition. This

difference in gender across groups might have an effect on the results and hence should be taken into consideration when interpreting the results.

Table 3

Distribution of Gender Across Groups

Gender	Control	In-group	Out-group
Male	4	9	5
Female	11	6	10
Total	15	15	15

The majority of the participants were nursing students, amounting to twenty participants out of forty-five. The other students studied Psychology, Engineering, Biology, or had other majors. The age range was from 18 to 21 years, with 22 out of the 45 being eighteen years old (48.9%). There was only one participant who was 21 years old (2.2%). The number of years the participants lived in Lebanon ranged from ten to twenty-one years, which indicated that all participants were exposed to sectarianism.

The participants were randomly assigned to the three different groups. The distribution of the five different sects is as shown in Table 4. Not all sects were equally represented in the experimental and control groups. Harb (2010) showed that there were no significant differences between the sectarian attitudes among Lebanese youth who came from different sect backgrounds. Thus, there are no differences to be expected between the control and experimental groups when it came to the sectarian attitudes. Appendix F shows the differences between groups based on demographics.

Table 4

Sects Across Groups

Sect	Control	Ingroup	Outgroup
Christian Maronite	5	5	5
Christian Orthodox	1	0	1
Muslim Sunni	5	3	4
Muslim Shiite	2	4	3
Druze	2	4	2
Total	15	15	15

## CHAPTER V

### RESULTS

The purpose of this study was to shed light on the difference between behavior driven by implicit attitudes and explicit sectarian attitudes. The ultimatum game was the tool used to examine implicit behavior. This chapter presents the behavioral and electrophysiological results of this study. For the former, the statistical assumptions, psychometrics, scale description, correlation matrix, paired t-tests and main analysis (mixed analysis of covariance) are reported. For the electrophysiological results, the data preprocessing is discussed first followed by the event-related potentials data.

#### **Behavioral Results**

The dependent variable, rate of rejection of offers, was calculated as follows. Three kinds of offers were presented to participants: fair, moderately unfair, and strongly unfair offers. The dependent variable was determined on a scale ranging from 0 to 2. The higher the participants scored the greater the rejection rates on the different offers.

**Statistical assumptions.** The assumption of normality was assessed for all continuous variables using standardized scores (z-scores) of skewness and kurtosis, as well as histograms that plot the rate of rejection. Variables with z-scores that were above  $|3.29|$ , corresponding to the  $p > .001$  criteria, were considered non-normally distributed. For the sectarianism scale and the Moral Identity scale, the z-scores for skewness and kurtosis were less than  $|3.29|$ , indicating normal distributions. Z-scores were also below  $|3.29|$  for the rate of rejection for moderately unfair offers, however, inspection of the histogram indicated a platykurtic distribution.

Univariate and multivariate outliers for the sectarianism scale, Moral Identity scale, rate of rejection of both moderately unfair offers, and strongly unfair offers were inspected. Standardized scores were examined for univariate outliers. Scores with z-scores above  $|3.29|$ , corresponding to the  $p > .001$  criteria, were considered outliers. None of the z-scores were greater than  $|3.29|$ , which implied that there were no univariate outliers in the data. Multivariate outliers were examined using Mahalanobis distance with a  $p < .001$  criteria. None of the cases scored greater than  $\chi^2(5) = 20.52$ , which demonstrated absence of multivariate outliers.

**Psychometrics.** The Moral Identity scale consists of 10 items, with items 3 and 4 reverse coded. The scale has two subscales, Symbolization and Internalization. The reliability of the first subscale (items 1-5) was tested using Cronbach's alpha. The Symbolization subscale had a low reliability, Cronbach's  $\alpha = .62$ . The Internalization subscale, on the other hand, had a higher reliability of Cronbach's  $\alpha = .67$ , but was still below the acceptable cut-off of  $\alpha = .70$ . For the sectarianism scale, the internal reliability was good, with Cronbach's  $\alpha = .85$ .

**Descriptive statistics.** A review of the rate of rejection across the different trials indicated that there was a floor effect for the fair trials. All fair offers were accepted. Since there was no variation in the score of the fair offers, and to enable a reliable analysis, the fair offers were not included in the main analysis for the behavioural results.

In this study, the two moderately unfair offers were \$12 and \$13 out of \$20, representing 30-35% of the stake size. Only 43.3% of the moderately unfair offers were accepted (39 out of 90). This is reflected in the mean  $M=1.13(.84)$ , since it indicates that almost half of the moderately unfair offers were accepted.

The strongly unfair offers were less than 20% of the offer size, \$8 and \$7 out of \$20. As the offers became strongly unfair, the frequency of acceptance was even less. Participants only accepted 17 strongly unfair offers, accounting for 18.9% of the total number of offers. The mean of the rate of rejection was  $M=1.62 (.75)$ . This showed that participants in this experiment seemed to reject more strongly unfair offers than moderately unfair offers.

Inspection of missing values for all variables indicated that there was only one missing value for the first fair trial in the ingroup condition. The sectarianism scale measured biases towards the ingroup. The higher the score on this scale the more the participant reported explicit sectarian attitudes. The mean was  $M=3.32$  with a large standard deviation,  $SD=.94$ . This suggests that, on average, participants were moderately biased towards their own sect. However, there was variability in the scores on this scale, with some scoring low and others scoring high on sectarianism. This was in accordance to earlier studies conducted by Koubeissi (2013) and Harb (2010) who tested for sectarian attitudes across the Lebanese youth.

As mentioned earlier, the Moral Identity scale was made up of two subscales, Symbolization and Internalization. The means of each subscale were  $M=3.07 (.66)$  and  $M=4.50 (.42)$ , respectively. The mean on Internalization was very high with small standard deviation. Internalization subscale referred to the extent to which one believed that moral identity was part of one's entity. Scoring high on this factor predicted a morally relevant behavior for individuals. On the other hand, participants did not score as high on the Symbolization subscale. This showed that, on average, participants did not believe in the necessity of self-presentational moral characteristics. It is expected that the extent to which moral identity was part of one's being was more important to the participants than behaving based on moral values.

**Correlation.** Several Pearson's correlations were conducted to assess the zero-order relationship between the rate of rejecting moderately unfair offers, moral identity subscales, and sectarianism scale. The only significant correlation was between the Moral Identity subscales, Internalization and Symbolization,  $r=.34, p<.05$ . There was a positive correlation with a medium effect size between the two subscales. This implies that as internalization increases, scores on symbolization are likely to increase as well. In other words, the more the participants believed that moral identity was the essence of one's being; the more they agreed that moral values should be exhibited in behavior.

Table 5 provides Pearson's  $r$  correlation between the different variables.

Table 5

Correlation Matrix

Moral Identity Symbolization subscale	Rate of Rejecting Moderately Unfair	Rate of Rejecting Strongly Unfair Offers	Sectarianism Scale
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	Offers			
Moral Identity Internalization subscale	.37*	-.05	-.03	-.15
Moral Identity Symbolization subscale		-.09	-.00	.03
Rate of Rejecting Moderately Unfair Offers			.37*	.21
Rate of Rejecting Strongly Unfair Offers				.13

*Note.* \*  $p < .05$

To test for the correlations between the rate of rejection of strongly unfair offers and moderately unfair offers, Kendall's tau was used because the assumption of normality was not met. The correlation was significant between the rate of rejection of strongly unfair offers and moderately unfair offers,  $\tau = .37, p < .05$ . This reflects a positive correlation with a medium to large effect size. It indicated that if the participants rejected moderately unfair offers they were also more likely to reject strongly unfair offers.

**One-Sample t-tests.** One sample t-tests were carried out between the rates of rejection of fair offers, and moderately and strongly unfair offers. The aim was to see if there was a significant difference between the participants' reactions to fair (flat rate) and unfair offers (both moderately and strongly unfair ones). One sample t-test showed that there was a significant difference between the rate of rejection of fair offers and moderately unfair offers with a large effect size,  $t(44) = -9.03, p < .001, r = .81$ . This

suggested that there was a difference in responding to an offer that was 50% of the stake size compared to one that was between 30 – 35% of the stake size. Also, there was a significant difference between the rejection rates of fair offers and strongly unfair offers with a large effect size,  $t(44)=-14.56$ ,  $p<.001$ ,  $r=.91$ . In other words, participants inclined to reject significantly more strongly unfair offers than fair offers. Hypothesis 9, which stated that participants would significantly accept more fair offers than unfair offers, was thus supported.

**Main analysis.** A mixed model ANCOVA was run with group interaction as the between participant variable with three conditions (control, ingroup and outgroup) and kind of offer as the within participant variable with two unfair offer (moderately and strongly). Sectarianism, as measured by Harb (2010), was included in the analysis as the covariate. The effect of moral identity on one's decision-making was also controlled for using the Moral Identity scale. The two subscales, Symbolization and Internalization, were entered as covariates in this analysis.

***Descriptive statistics per group.*** The rates of rejection of the different offers across groups (control, ingroup and outgroup) and conditions (moderately and strongly unfair offers) are first presented. Then the different means across groups on sectarianism and Moral Identity are described.

***Rate of rejection of offers.*** The means of rate of rejection are presented in Table 6. The highest mean for the rejection rates was for the strongly unfair offers in the control group. For the other two conditions, ingroup and outgroup, the rejection rates were also high for the strongly unfair offers. For the moderately unfair offers, the mean of the rate of rejection were less than that of the strongly unfair offers, which was to be



expected. Again, the control groups scored the highest among the three conditions in this category.

Table 6

Descriptive Statistics for Rate of Rejection across Groups

Condition	Rate of rejecting moderately unfair offers		Rate of rejecting strongly unfair offers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Control	1.33	.82	1.87
Ingroup	.87	.83	1.53	.83
Outgroup	1.20	.86	1.47	.83

*Sectarianism scale.* Table 7 shows the means with standard deviations of the scores on sectarianism scale across conditions. There was a small variation in the scores on the sectarianism scale across groups. The highest mean on this scale was for the participants in the outgroup condition. Participants who carried out the ingroup, condition reported to have the least explicit sectarian attitudes. Hence, there was a variation of sectarian attitudes between participants in the ingroup condition, on one hand, and outgroup and control, on the other hand.

*Moral Identity scale.* Participants in the control condition reported the highest average on the Internalization subscale. Table 7 presents the different means of the Moral Identity subscales for the experimental and control groups. Participants in the ingroup condition had the lowest mean on the Internalization subscale, but the scores were still above the midpoint. For the Symbolization subscale, the control group had the lowest average. Participants in the ingroup condition had a slightly higher mean, which was equal to the midpoint. The outgroup condition had a score close to the midpoint.

Table 7

## Scales Descriptive

Condition	Sectarianism Scale	Moral Identity Scale	
		Symbolization	Internalization
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Control	3.43 (.86)	2.93 (.74)	4.61 (.38)
Ingroup	3.03 (1.14)	3.00 (.64)	4.37 (.38)
Outgroup	3.52 (.77)	3.27 (.57)	4.52 (.47)

**Statistical assumptions.** There sample sizes were equal across groups (15 participants per group). Power was small for the analysis of behavioral results (Tabachnick & Fidell, 2007). If more trials were added to enhance power, there would be a decrease in the believability, and thus ecological validity, of the experiment. The demand characteristics in this case would lead to unreliable data. Decreasing demand characteristics was the chosen advantage over increasing power for the behavioral results. Adding more participants could also increase the power of the study. However, EEG procedure limited the inclusion of more than 45 participants in this experiment. For this reason, the power of the research design was not optimal to carry out a mixed ANCOVA.

Assumptions for mixed ANCOVA were inspected. They included multivariate outliers, absence of multicollinearity and singularity, normality, homogeneity of variance, independence of covariates and dependent variables, and homogeneity of regression slopes.

**Multivariate outliers.** As discussed earlier, there were no univariate or multivariate outliers in the behavioral results. Univariate outliers were presented before.

Leverage was also calculated to check for multivariate outliers within groups. Again, there was no score that was greater than  $h_{ii}=1.53$ .

*Multicollinearity and singularity.* ANCOVA requires that the covariates are not correlated with each other. As indicated in the correlation analysis reported above, the covariates (Sectarianism scale and Moral Identity) were not correlated. The assumption of multicollinearity and singularity was met.

*Normality.* The assumption of normality implies normal distribution of scores in each group. Normality was tested using standardized scores (z-scores) of skewness and kurtosis across groups. Table 8 presents these components of normality for each condition. The only condition in which z-skewness and z-kurtosis was above  $|3.29|$  was in the control group that presented with strongly unfair offers. The rest of the cells had acceptable z-skewness and z-kurtosis (i.e. less than  $|3.29|$ ). This revealed that the assumption of normality was not met. However, according to Field (2009), an ANCOVA analysis is robust to violations of normality if there are equal sample sizes. Given that the sample sizes between groups and conditions are equal, the  $F$ -statistic would be robust to violations of normality in this case.

Table 8

Normality Components Across Groups

		Condition		
		Control	Ingroup	Outgroup
Rate of rejecting moderately	<i>z-skewness</i>	-1.28	-0.47	-0.75
unfair offers	<i>z-kurtosis</i>	0.91	1.34	-1.37
Rate of rejecting strongly unfair	<i>z-skewness</i>	-6.68*	-2.41	-2.00
offers	<i>z-kurtosis</i>	13.38*	0.11	-0.37

Note: \* greater than 3.29 or less than -3.29

*Homogeneity of variance.* The assumption of homogeneity of variance tests whether the variances between each group is equal. Homogeneity of variance was tested across the three different conditions (control, ingroup and outgroup). For the rate of rejection of moderately unfair offers, Levene's test was not significant,  $F(2,42)=.02$ ,  $p>.05$ . This means that there was homogeneity of variance across conditions for moderately unfair offers. For strongly unfair offers, the assumption was not met,  $F(2,42)=4.38$ ,  $p<.05$ . This indicates that variances across groups for the rate of rejection of strongly unfair offers were not equal. According to Field (2009), ANCOVA is robust to violations of homogeneity of variance if there are equal sample sizes across groups. In this study each group contained equal number of participants (15 per group). For this reason, ANCOVA could still be conducted without having an inflation of Type I error.

*Independence of covariates and dependent variable.* ANCOVA assumes that there is independence between the covariates and the experimental effect. To test for this assumption a multivariate ANOVA was carried out with covariates, sectarianism attitudes and the two Moral Identity subscales, as dependent variables. The F-ratios for the different conditions were not significant. Hence, the variance explained by the covariates was not based on the differences among groups. The assumption of independence of covariates and dependent variable was thus met.

*Homogeneity of regression slopes.* The assumption of homogeneity of regression slopes requires that the covariates are independent of the different conditions. The interaction between condition and sectarian attitudes was not significant,  $F(2, 33)=1.25$ ,  $p>.05$ . The interaction between the three different conditions and Moral Identity subscales was also not significant. The model showed no significant interaction between

conditions and Moral Identity Internalization subscale and Symbolization subscale, with  $F(3,33)=.57, p>.05$  and  $F(3,33)=.75, p>.05$ , respectively. Thus, the assumption of homogeneity of regression slopes was met.

**Mixed ANCOVA.** A 3x2 mixed ANCOVA was carried out with rate of rejection of offers as the dependent variable. There were two independent variables, one manipulated within-group (kind of offer) and one between-group (group interaction). There were two different offers, moderately unfair and strongly unfair. There were three between-group conditions, control, ingroup and outgroup. The sectarianism scale and Moral Identity subscales were included as covariates to control their effects on the rejection rate of the different offers. The effects of covariates and differences between conditions are presented next.

*Effects of covariates.* The effects of the covariates were not significant. Sectarian attitudes did not show a significant effect on the rate of rejecting offers in the ultimatum game,  $F(1,39)=1.30, p>.05$ . Thus, sectarian attitudes did not affect how participants played the ultimatum game. This implied that hypothesis 8 (scoring high or low on the sectarianism scale will correlate with the rate of rejection of moderately unfair offers coming from proposers of a different sect) was not supported by the behavioral results.

Similarly, the Moral Identity Internalization and Symbolization subscales did not have a significant effect on the dependent variable,  $F(1,39)=.00, p>.05$  and  $F(1,39)=.07, p>.05$ , respectively. This showed that moral identity did not predict rejection of different kinds of unfair offers in this experiment.

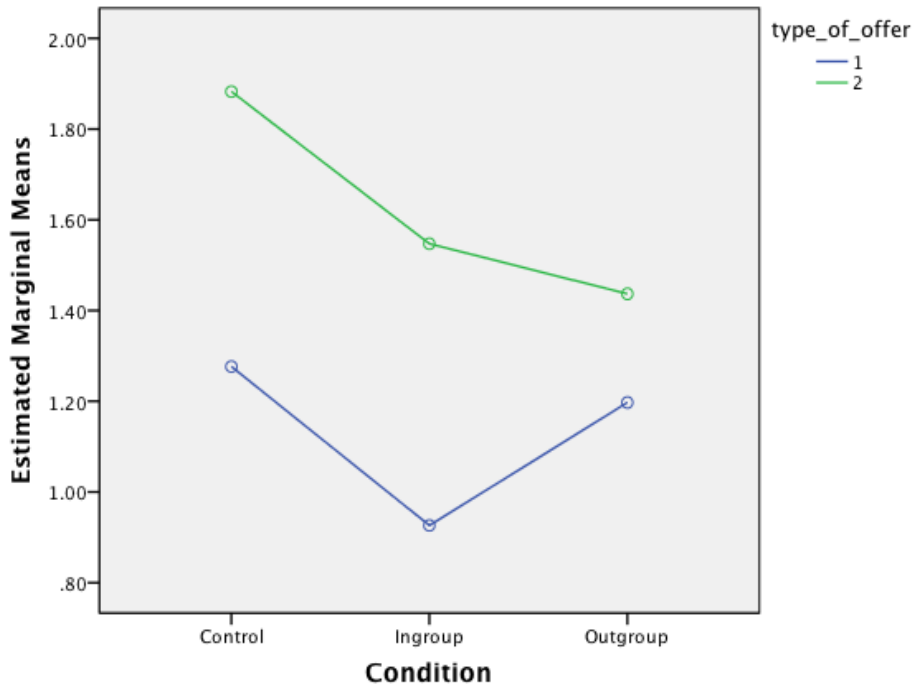
*Main effects of independent variables.* It was predicted that moderately unfair offers proposed by a person from the same sect would be rejected significantly less often than moderately unfair offers from one belonging to a different sect or from the

control group, controlling for morality and explicit sectarian attitudes (hypothesis 7). To test this hypothesis, the main effects and the interaction effects of fairness of the offer and group interaction are presented.

There was no significant difference between conditions, control, ingroup and outgroup,  $F(2,39)=.97, p>.05$ . All participants, no matter if they were playing with someone from their own sect, different sect or in the control group, had similar patterns of rejection.

In the main analysis, the kind of offer, moderately or strongly unfair, did not have a significant effect on rate of rejection of offer,  $F(1,39)=.60, p>.05$ . However, Bonferroni post-hoc tests indicated a significant difference between the means of these two groups. The rejection rate of the moderately unfair offers ( $M=1.13, SE=.13$ ) were significantly lower than those of the strongly unfair offers ( $M=1.62, SE=.11$ ),  $t(44)= -3.57, p<.05, r=.15$ . This had a small effect size.

The interaction between offer type and group of interaction was not significant,  $F(2,39)=.78, p>.05$ . This implied that hypothesis 7 was not supported. Figure 4 illustrates the rejection rates for the different types of offers across the three experimental groups. The power was small and that may be the reason for the lack of significance in the behavioral results. However, adding more trials would compromise the ecological validity of the study. As mentioned earlier, increasing number of participants also enhances the power of this study. In our case, we did not have the resources to make that possible.



*Figure 4.* Rate of rejection of different trials across groups. The types of offers were moderately unfair (1, represented by the blue line) and strongly unfair (2, represented by the green line).

### **Electrophysiological Results**

This section consists of the analysis of the electrophysiological results recorded by EEG. Steps of data preprocessing are first presented, then statistical assumptions are explored. An analysis follows of each of the event-related potentials, MFN, P300 and LPP. Each is then discussed separately.

**Data preprocessing.** All ERP analyses were carried out using Brain Vision Analyzer software. The signal was filtered (offline) using a 40Hz low pass filter, 48 dB/octave attenuation, 53 Hz high pass filter and 50 Hz notch filter. Paroxysmal artifacts were manually marked for rejection. Noisy channels were dismissed. Independent component analysis (ICA) was carried out with the *infor*max algorithm. All the components corresponding to artifacts were removed from the continuous EEG data. After that, artifacts caused by ocular movements were corrected using ICA by removing EOG-related components. Finally, all channels were re-referenced to an

average reference. Visual inspection of the data was carried out and further analysis was done using statistical algorithms in SPSS program.

The data from two participants had too many artifacts and were therefore deleted. One belonged to the control and one to the outgroup conditions. Similar trials (2 fair, 2 moderately unfair and 2 strongly unfair) were averaged out for each participant. As mentioned previously, epochs were then extracted between 260ms and 800ms for Fz, Pz and Cz. Data from 260ms to 360ms were compared to examine the P300 event-related potential. The time frame 375ms to 475ms was analyzed for possible MFN changes. The late event potential, LPP, is said to occur between 500 and 800ms, so the epochs in this time frame were also extracted.

**Statistical assumptions.** Five 3x3 mixed ANOVAs were conducted in total. MFN, P300 and LPP were tested across all groups and conditions. For all analyses, the within subject variable was the level of fairness of the offer given, which had three levels, fair, unfair, and very unfair. The between subjects factor, group, also had three levels, control, ingroup, and outgroup. Results of the analyses are presented below. The statistical assumptions for each of the five ANOVAs are described together. The results of repeated measures analyses are then presented.

**Normality.** The assumption of normality was assessed for the continuous variables using standardized scores (z-scores) of skewness and kurtosis, as well as histograms that plot the rate of rejection. Variables with z-scores that were above |3.29|, corresponding to the  $p > .001$  criteria, were considered non-normally distributed. For the Fz, Cz, and Pz MFN averages for the fair, unfair, and very unfair trials, the z-scores for skewness and kurtosis were less than |3.29|, indicating normal distributions. Z-scores were also below |3.29| for P300 and LPP for the fair, unfair, and very unfair offers,



indicating normal distribution as well. The assumption of normality was thus met for all amplitudes.

***Univariate and multivariate outliers.*** Univariate and multivariate outliers for the Fz, Cz, and Pz MFN scores for the fair, unfair, and very unfair trials, were inspected. Standardized scores were examined for univariate outliers. Scores with z-scores above  $|3.29|$ , corresponding to the  $p > .001$  criteria, were considered outliers. None of the z-scores were greater than  $|3.29|$ , which implied that there were no univariate outliers in the data.

Multivariate outliers were examined using Mahalanobis distance with a  $p < .001$  criteria. None of the cases scored greater than  $\chi^2(3) = 16.27$  for any Fz, Cz, and Pz, values respectively. Multivariate outliers for the P300 and LPP scores for the fair, unfair, and very unfair trials were also inspected. Again, none of the cases scored greater than  $\chi^2(6) = 22.46$  for the P300 and LPP across trials respectively, which demonstrated the absence of multivariate outliers.

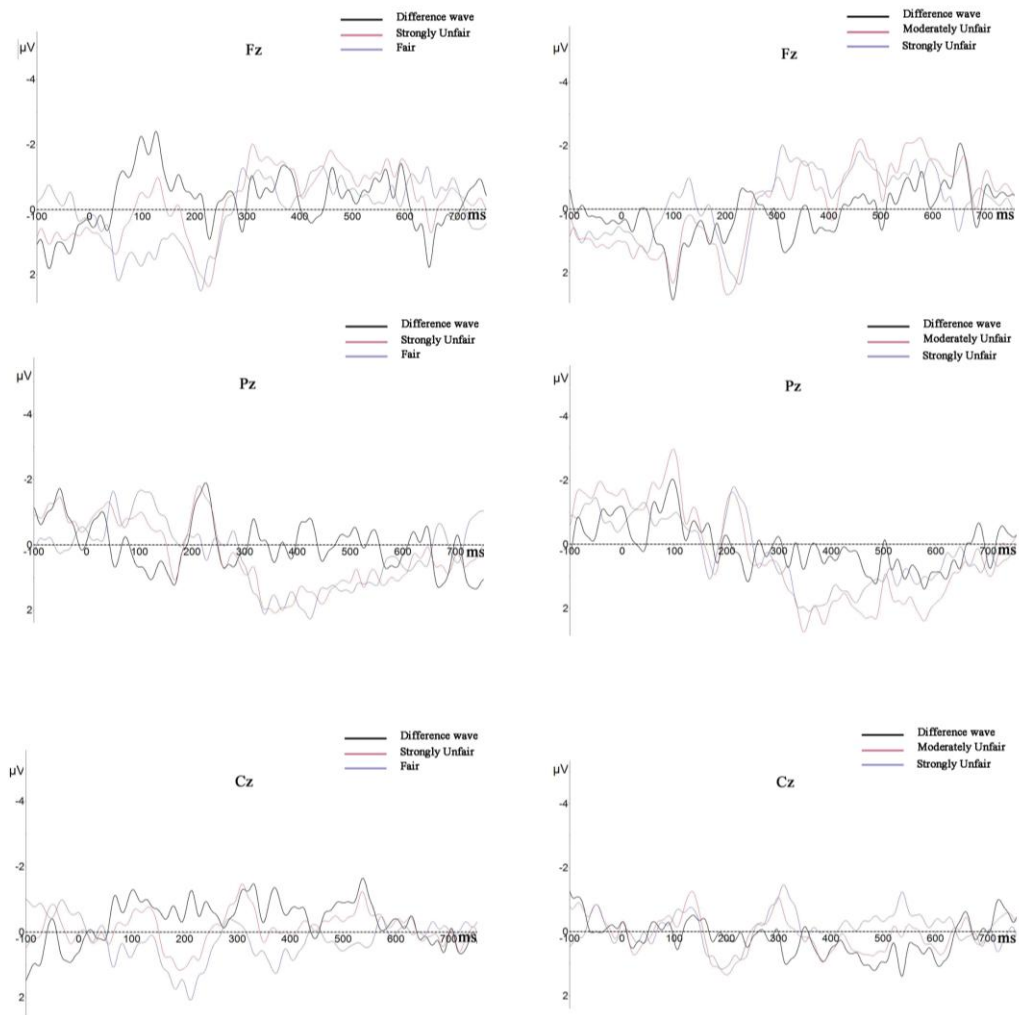
***Homogeneity of variance.*** The assumption of homogeneity of variance tests whether or not the variances between groups are equal. Homogeneity of variance was tested across the three different conditions (control, ingroup and outgroup) for Fz as well as Cz, and Pz MFN across fair, unfair, and very unfair trials. Levene's test was not significant for all comparisons. Hence, the assumption of homogeneity of variance was met.

***Sphericity.*** The assumption of sphericity tests whether or not both the variances across conditions and the covariances between different pairs of conditions are equal. For the Fz, Pz and Cz, MFN the assumption of sphericity was met,  $\chi^2(2) = .99, p > .05$ ,  $\chi^2(2) = .35, p > .05$ , and  $\chi^2(2) = 5.52, p > .05$ , respectively. For the sphericity of P300 across

conditions, the assumption was violated;  $\chi^2$  results of the mixed ANOVA for P300 will have to assume that sphericity was not met.

**MFN.** Recordings from Fz, Pz and Cz after 375ms of stimulus presentation are illustrated in figure 5 for fair, moderately unfair and strongly unfair offers. 3x3 mixed ANOVAs tested differences in MFN for Fz, Cz, and Pz separately. Results indicated that there were significant differences for the main effect of fairness on Fz,  $F(2,80)=5.71, p<.01, r=.26$ , and on Pz,  $F(2,78)=9.30, p<.01, r=.33$ . There were no significant differences between fairness conditions on Cz,  $F(2,80)=1.04, p>.05$ .

There were no significant differences for the main effect of the between subject variable, group interaction, for Fz, Pz and Cz,  $F(1,40)=.34, p>.05, F(1,40)=.60, p>.05$ , and  $F(1,39)=.09, p>.05$ , respectively. Thus, hypothesis 4 - MFN shows no significant difference for sect, controlling for fairness of the offer) was supported. There were also no significant interaction effects between fairness conditions and groups for Fz, Pz and Cz,  $F(4,80)=.04, p>.05, F(4, 80)=.74, p>.05.$ ,  $F(4,78)=1.80, p>.05$ , respectively. Hence, there were no differences on frontal negativity when moderately unfair offer comes from a proposer belonging to a different sect compared to one that comes from a proposer belonging to the same sect. Hypothesis 1 was thus not supported.



*Figure 5:* Time locked ERPs across three different electrodes, Fz, Pz and Cz. The difference wave between fair, moderately unfair and strongly unfair offers is illustrated.

Post-hoc tests using Bonferroni correction to control for family-wise error were conducted to see where the differences in fairness conditions existed for both Fz and Pz. There were significant differences between the fair and moderately unfair conditions for Fz and Pz. For Fz, there was significantly more negativity in moderately unfair offers than fair offers (mean difference= 1.46, SE=.34). Similarly, for Pz, there was negativity in moderately unfair offers compared to fair offers (mean difference=1.62, SE=.39). The only difference between fair and strongly unfair offers in MFN was on Pz electrode, (mean difference=.50, SE=.19). Strongly unfair offers elicited more negativity than fair

offers on this electrode. Hypothesis 3, which states that for fair offers the frontal negativity would be significantly lower than unfair offers, was thus supported by the findings.

**P300.** P300 amplitude is assessed between 260ms to 360ms time window for the average of Fz, Cz and Pz.

**One-sample t-test.** To further investigate the findings a one-sample t-test was conducted to see if there was a significant positive amplitude after about 300ms of the stimulus presentation (P300) in fair, moderately unfair and very unfair conditions. The results were significant for the three conditions. For fair offers, P300 with  $t(42)=3.96$ ,  $p<.001$ ,  $d=1.22$ ,  $r=.52$ . For moderately unfair offers,  $t(42)=3.31$ ,  $p<.01$ ,  $d=1.02$ ,  $r=.45$ . For strongly unfair offer, P300 was also significant with a large effect size,  $t(42)=2.55$ ,  $p<.05$ ,  $d=.79$ ,  $r=.46$ . Hypothesis 5, which states that P300 would be elicited in all different kinds of offers, was thus supported.

**Mixed ANOVA.** One mixed ANOVA tested P300 across the three conditions. Since the assumption of sphericity was not met for P300, the F-statistic for Greenhouse-Geiser was reported. Results indicated that there were no significant differences for the main effects of fairness  $F(1.67,66.74)=.85$ ,  $p>.05$  and group  $F(2,40)=.67$ ,  $p>.05$ . There was also no significant interaction effect between fairness conditions and groups  $F(3.53,70.67)=1.29$ ,  $p>.05$ .

**LPP.** Averaging the recordings from Fz, Pz and Cz and inspection of that data between 500ms and 800ms allows us to examine the event-related potential LPP.

One mixed ANOVA tested LPP across the three conditions. Results indicated that there were no significant differences for the main effects of fairness  $F(2,80)=.30$ ,  $p>.05$ , and group  $F(2,40)=.24$ ,  $p>.05$ . Hence, the expectation that, controlling for group

interaction, LPP would not show more positivity in fair compared to unfair offers (hypothesis 6) was supported. There was also no significant interaction effect between fairness conditions and groups  $F(4,80)=1.29, p>.05$ . This shows that late positive potential was not elicited in any condition. Thus, hypothesis 2 was not supported.

## CHAPTER VI

### DISCUSSION

Sectarianism is an intergroup bias present in the Lebanese society. This bias may have several facets, such as ingroup favoritism and outgroup derogation. However, research supports the presence of ingroup favoritism among the Lebanese youth (Harb, 2010). A handful of studies on intergroup interactions show discrepancies between explicitly reported attitudes and implicit attitudes that most probably lead to discriminatory behavior. We aimed to investigate if the Lebanese youth, who report high on ingroup favoritism, would also reflect implicit biases on their brain activity. In addition, we asked participants to play the ultimatum game with proposers from their ingroup or outgroup. This allowed for the collection of behavioral data to examine discriminatory behavior. In this chapter, we discuss the electrophysiological results, behavioral results and the responses to self-report scales.

Sectarianism, as a social emotion, did not have an effect on the negativity in the neural activity. Our findings show that LPP did not reflect implicit attitudes towards people from different sects. This contradicts other findings. For instance, Ito et al. (2004) showed that LPP was elicited during the emotional reactions to different race. This ingroup bias could not be traced in explicit reported likability of the stimulus. Moreover, they found that LPP correlated with explicit self-report measure of racism.

Wang et al. (2014) also showed the LPP reflected implicit ingroup favoritism. The authors explained that greater LPP was a result of increased attentional resources dedicated to situations in which ingroup members were at a disadvantage.

Social emotion that is elicited by the ingroup membership based on sect is not similar to that based on race. For racism, first facial perception occurs. This is reflected in N200 event-related potential (Ito et al. 2004; Kubota & Ito, 2009). After that, ingroup bias towards people from the same race are triggered and reflected by LPP. In our context, Lebanon, the activation of sect group is not based on facial cues but rather on the other person explicitly stating the sect or place of origin within Lebanon. There is no research, to our knowledge, that studies the bases of categorization of people into different sects. Hence, the process of categorization based on sect is fundamentally different than that of race. Whereas racism requires more attentional resources for ingroup members, as reflected in LPP (Ito et al. 2004), ingroup biases based on sect may demand the activation different emotional systems in the brain.

It is noteworthy that LPP was not elicited under different fair and unfair offers that come from ingroup or outgroup members. This was not the case in Wu et al.'s (2011) experiment. They studied the effects of LPP on different social comparisons: downward, lateral and upward comparisons. In the downward comparisons, participants were offered fair and unfair offers that were more than the offers given to other recipients. In upward comparisons, participants were offered less. In lateral comparisons, participants received the same offers as other recipients. Results showed that LPP was more positive for moderately unfair offers than for strongly unfair offers when others offered less to the participants. Wu et al. (2011) also found that LPP is more sensitive in social comparisons than to offer size. Our findings did not show a

difference in the LPP across offer size and ingroup membership based on sect. As mentioned earlier LPP did not reflect group membership in our study. Hence, LPP would not be elicited by offer size. Social emotions (ingroup favoritism) are not reflected by LPP and thus cannot be altered by offer size.

Examining the neural activity for responders as they were presented with different kinds of offers, we found that the medial frontal negativity was elicited differently in fair, moderately unfair and strongly unfair offers. It was more pronounced in strongly unfair offers than in fair ones. This replicated the findings in Boksem and De Cremer's (2010) study. We also tested for moderately unfair offers. As expected, the MFN was less pronounced for moderately unfair offers than strongly unfair offers. This shows that the more unfair the offer, the more visible negativity in fronto-central and centro-parietal electrodes was elicited.

Source analysis illustrated that the MFN generates from the anterior cingulate cortex (ACC; Gehring & Willoughby, 2002). ACC has been shown to activate in at least four different kinds of conditions or cognitive processes. The first is for the reward-prediction error (Gehring & Willoughby, 2002). The second is during the reception of negative feedback. The third is when individuals are subjected to monetary loss. Finally, ACC is also associated with the affectively distressing components of social pain (Eisenberger & Lieberman, 2004). Accordingly, MFN might be elicited in some or all of these situations. As mentioned earlier, Boksem and De Cremer (2010) showed that MFN amplitudes are greater during unfair offers compared to fair offers. Since ACC activates during the experience of social pain, they argued that the MFN reflects unfavorable social outcomes.

Based on this assumption, we examined the variations of MFN on offers from the ingroup, outgroup and control conditions, while controlling for the fairness of the offer. Social emotions provoked by interacting with someone from your own group, (i.e. ingroup favoritism) might decrease the social pain elicited by unfair offers. It was expected that the medial frontal negativity amplitudes would be smaller when unfair offers are given from an ingroup member compared to an outgroup member or a control. Our findings did not support this hypothesis. The results showed that MFN amplitudes were not significantly different in conditions when the responder played with someone from their own sect.

Sectarianism, as a social emotion, did not have an effect on the negativity in the neural activity. As mentioned before, MFN is elicited by the reward-prediction error based on moral norms. It seems that participants expect proposers from same or different sect to present them with the same offers. In other words, there was no expectancy that ingroup members should react in a fair way compared to the outgroup or control groups. This implies that during intergroup interaction in the ultimatum game, the expectations of proposing a fair offer is based on moral norms and does not vary based on the belonging of the proposer to the ingroup or outgroup (ingroup or outgroup).

The third and final event-related potential we studied was P300. P300 potential has been shown to reflect the cognitive processes of decision-making and attention (Picton, 2000). In our study, P300 amplitudes did not differ across kinds of offers and social context (inter or intra-group interaction). Also, MFN amplitudes were unrelated to P300 amplitudes. Hence, P300 elicited after 300ms of the stimulus presentation might reflect either attention or decision-making processes, or both. It is noteworthy



that P300 was elicited only during the presentation of the offer. Given that the participants are then required to decide on whether or not they will take the offer, it is plausible that P300 might reflect decision-making. However, we cannot rule out that P300 might resemble more attentional recourses provided during offer presentation as a primary step for other cognitive processes, such as decision making.

For the behavioral results, this study replicated the rejection rates in the ultimatum game reported by Guth et al. (1983). Cultural differences did not have an effect on participants' responses in this bargaining game. Unlike other cultures, such as the Kazkh or Quichua in which there were no rejection rates, Lebanese youth at AUB responded based on fairness concerns. All fair offers that were 50% of the stake size were accepted, which is in agreement with almost all studies on the ultimatum game (Tabibnia, Satpute & Lieberman, 2008; Boksem & De Cremer, 2010; Guth, 2013). Our results also supported the evidence on the difference between offers less than 20% of the stake size and offers between 30 and 35% of the stake size. We refer to the first offer as strongly unfair and to the second as moderately unfair. Both, the moderately unfair offers and the strongly unfair offers, were rejected more often than fair offers. The strongly unfair offers were accepted only about 20% of the time. In addition, the moderately unfair offers were rejected 43.3% of the time. This is congruent with Polezzi et al.'s (2008) study in which almost half of the mid-value offers were rejected.

It is noteworthy that participants in this sample of Lebanese youth scored very high on the self-importance of moral characteristics – Internalization. Aquino and Reed (2002) showed that those who hold high regards of this trait are more likely to donate money. In this study, there was no correlation between the scores on moral identity and rejection rates. Internalization scores did not explain the behaviors of responders in the

ultimatum game. Moreover, the participants did not score high on the Symbolization dimension of Moral Identity scale. This subscale was shown to strongly correlate with religiosity. Religiosity which, according to Aquino and Reed (2002), may be regarded as the symbolic expression of essential beliefs and values, was more related to Symbolization than to Internalization. Keeping in mind that the reliability analysis of this scale was low, we could deduce from this sample that this sample of Lebanese youth has elements of moral traits embedded in its self-concept and holds in less regard the symbolic expression of moral values. Our results also showed that there is a medium correlation between Symbolization and Internalization scores, replicating the findings of Aquino and Reed (2002).

Our sample of Lebanese AUB students showed above neutral ingroup favoritism. These scores were similar to those found by Koubeissi (2013), who used a sample of Lebanese AUB students. They were less than those demonstrated by Harb (2010) on a representative sample of the Lebanese youth, however. Having such explicit sectarian attitudes led to our hypothesis of significant differences on response rates for proposers who belong to the same sect. There was a trend showing a decrease in the rejection of moderately unfair offers when the proposer belonged to the same sect as the responder. However, this effect failed to reach significance levels because of the behavioral results' low statistical power. This was a limitation of this study which will be discussed further below. Hence, implicit sectarian attitudes could not be inferred based on the rejection rates.

### **Limitations and Future Research**

This experiment presents a new window into implicit and explicit sectarianism using the ultimatum game. The main findings pertained to the neural activity level that

was tested for a reflection of implicit attitudes in cognitive processing. There are some limitations to this experiment.

To start with, the manipulation check would have allowed us to learn if the participant was aware of the proposer's sect. Unfortunately, the second session and the debriefing session were far apart. Thus, we could not carry out a manipulation check to make sure that the participants believed they were playing with a real proposer. The latter took place after the data collection phase ended. This was a major drawback of the design.

In addition, according to Boksem and De Cremer (2010), EEG studies examining social interactions always suffer from a trade-off between the completion of enough trials in a condition and the attainment of ecological validity. Polezzi et al. (2008), for instance, asked their participants to play for two hundred trials in the ultimatum game. In such a situation, it becomes harder for participants to believe that they are interacting with a real person. To reinforce the believability of the social exchange, we decided to ask participants to play only a limited number of trials in the ultimatum game. It was of paramount importance for valid EEG data that participants truly believed they were trading with another real person. Thus, limiting the trials was essential to increase believability of the social interaction. This decreased the power of the study because we could not run either 200 people in the EEG or 200 trials. So our design was a compromise in favor of EEG data.

So, the disadvantage of such a decision is the resulting low power to detect significant differences between conditions in the behavior. The limited power of the behavior hindered the proper examination of implicit attitudes and discriminatory behavior. The increase in the number of trials would have had a negative effect on the

credibility of the experiment. Future research in Lebanon should direct a number of different resources to study implicit discriminatory behavior rather than solely rely on self-reported attitudes of sectarianism. This might lead to the ability to distinguish between ingroup favoritism and the absence of outgroup biases. Testing implicit versus explicit sectarian attitudes is crucial. Implicit behaviors on sectarian attitudes may be tested using different implicit measures (Olson, 2009), and such measures will then meaningfully supplement our understanding of the sources of sectarianism.

The lack of significant results across the social interaction might also be due to the failure to investigate other event-related potentials. However, no previous research correlates social emotions to such other ERPs. The research in this area is still developing, and we based our focus on the limited available literature. Future research on other event-related potential(s) might reflect in-group favoritism, but this remains a speculation at this point in the neuroscientific study of social emotions.

Another important limitation in this study is the lack of generalizability of the behavioral results to the rest of Lebanese society. Our sample is made up of young university students aged from 18 to 21 years. This limits the generalizability to the Lebanese population which of course includes other age groups. AUB is also known to encourage the interaction of several different sects and does not allow sectarian discrimination on its grounds. Furthermore, the sample was very small and thus failed to represent all the different sects in Lebanon. For example, other Christian minorities, such as protestants, were not represented in the sample. Hence, we cannot generalize our findings to all sectarian groups in Lebanon. The sample also was made up of more females than males. Research on gender and ultimatum game showed that the rejection

rates of males and females sometimes differ (Saad & Grill 2001; Solnick, 2001). Thus, gender might have been a confounding variable in our experiment.

Finally, the Moral Identity scale developed by Aquino and Reed (2002) had low reliability. There might be cultural differences on this scale. Hence, a study using a large number of participants (greater than 200) that tackles different regions of Lebanon should be done to validate this scale. This may open a new window of proper description of moral values in Lebanese society and might tell us how much they predict other variables such as religiosity. They might also correlate with rejection rates in the ultimatum game.

There are no previous studies that have addressed the differences between implicit and explicit sectarianism using an EEG. The experiment we conducted aimed at investigating three different variables, discriminatory behaviors, self-reported attitudes and neural activity. Since there is very limited research in this area to derive more precise hypotheses, we explored various event-related potentials in the hope to find a correlation between them and implicit sectarian attitudes. The experiment we conducted was the first of its kind, with variables and EEG measures that had never been attempted before. Unfortunately, MFN, LPP and P300 did not predict implicit sectarian attitudes and future research needs to examine why, especially in terms of EEG measures. However, our results are helpful to future research and can point out that these event-related potentials fail to reflect social emotions, specifically sectarianism in the social context of Lebanon.

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## Appendix A

**Information Sheet**  
**American University of Beirut**  
P.O. Box 11-0236  
Riad El Solh, 1107 2020  
Beirut, Lebanon

**ORAL CONSENT TO SERVE AS A PARTICIPANT IN A RESEARCH PROJECT**

Research Project:	<i>An ERP study using the ultimatum game in a sample of AUB students</i>
Project Director:	<i>Arne Dietrich, Ph.D.</i> <i>Professor of Psychology, Department of Psychology, AUB</i> <a href="mailto:ad12@aub.edu.lb">ad12@aub.edu.lb</a> <i>01-350000 Ext. 4369</i>
Research Investigator:	<i>Areej W. Yehia</i> <i>Graduate Student of Psychology, Department of Psychology, AUB</i> <a href="mailto:awy01@aub.edu.lb">awy01@aub.edu.lb</a>

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*We are asking you to participate in a **research study**. Please read the information below and feel free to ask any questions that you may have.*

### **Nature and Purpose of the Project:**

*The process of decision making is a major aspect of individual's life and it is constantly affected by attitudes and beliefs. The purpose of this study is to identify brain and behavioral responses in decision making and the correlation between the two. One way to demonstrate that is by using a decision making game known as the ultimatum game. Brain activity can be picked up by a technique called electroencephalogram (EEG) while behavioral responses illustrate the results of decision making processes. Research designs often require that the full intent of a study not explained prior to participation. Although we have described the general nature of the tasks that you will be asked to perform, the full intent of the study will not be explained to you until after the completion of the study.*

### **Explanation of Procedures:**

*As a research participant, you will have to read this information and consider carefully your participation. The experiment is carried out across two sessions.*

*In the first session, in addition to the personal information form that you will receive, you are kindly asked to fill out two scales. The first is referred to the handedness scale and helps in the analysis of the brain activity. The second scale is the morality scale which illustrates individual's fairness concerns. You are only urged to*

answer in a truthful and honest manner. After that, the investigator will briefly explain how the second session will take place. Instructions for playing the decision making game and examples are demonstrated prior the actual data acquisition of the brain activity.

It is expected that your participation in this experiment will not take more than 20 minutes in the first session. Then you might be selected to carry out the second session which will last for 40-45 minutes. Selection procedure is required given the limited amount of participants needed in the second part of the experiment. If you happen to be randomly chosen to continue, the experimenter will contact you to schedule the following session.

In the second session, you will then be asked to play a decision making game called the ultimatum game on a computer. The proposers will be seated in the Psychology Lab in Nicely and will play the decision making game online while the responders will have their brain activity recorded using an electroencephalogram (EEG) located in Jesup 107A. Then the participant is asked to fill out a scale that determines the person's beliefs in a specific social situation.

Your name will be asked and your information will be kept confidential. Only the project director and the research investigator will have access to your personal data. All results will be kept in a locked cabinet in the office of the research collaborator for a period of five years after which the data will be shredded.

#### **Potential Discomfort and Risks:**

The EEG records ongoing brain activity that you produce naturally. Thus, the EEG is a safe equipment and has little to no possible health risks. You may experience a little discomfort as the electrodes are applied but the recording itself is painless. Thus, there are no more than minimal risks associated with participation in this experiment, although the possibility of some unforeseeable risks exists.

#### **Potential Benefits:**

The potential benefit is that you will participate in a study that will contribute to the field of Social Neuroscience. The results of this study will help understand the process of decision making on the behavioral and cognitive levels.

#### **Costs/Reimbursements:**

Your participation in this experiment incurs no costs and there are some monetary incentives. You will receive an extra point on your final Psych 201 grade upon the completion of the tasks in first session of the experiment.

#### **Alternative Procedures:**

If you wish not to participate, you could either write a brief report on an article in a psychological journal or participate in another study.

**Alternatives to Participation:**

*You could either write a brief report on an article in a psychological journal or participate in another study, if you decided not to participate in this experiment.*

**Termination of Participation:**

*Should you decide to give consent to participate in this survey, the project director co-investigator might disregard your answers if the results show that you have not abided by the instructions given at the top of each set of questions.*

**Confidentiality:**

*The results of your participation will be kept confidential to the fullest extent possible. This means that only the project director and co-investigator will know about your specific results, which will be anonymous, as the identifying information would be linked to the data you provided up until data are analyzed. Only information that cannot be traced to you will be used in reports or manuscripts published or presented by the director or investigator. Hard copy data will be kept in a locked cabinet in the office of the co-investigator for a period of seven years following the termination of the study. Raw data on data-recording systems will be kept in a password protected computer in the Psychology Lab. After the seven years have elapsed, the raw data will be shredded (hard copies) and deleted (soft copies).*

**Withdrawal from the Project:**

*Your participation in this survey is completely voluntary. You may withdraw your consent to participate in this research at any point without any explanation and without any penalty. You are also free to walk out of the experiment at any point in time without any explanation.*

**Who to Call if You Have Any Questions:**

*The approval stamp on this consent form indicates that this project has been reviewed and approved for the period indicated by the American University of Beirut (AUB) Institutional Review Board for the Protection of Human Participants in Research and Research Related Activities.*

*If you have any questions about your rights as a research participant, or to report a research related injury, you may call:*

*IRB, AUB: 01-350000 Ext. 5543 or 5540*

*If you have any concerns or questions about the conduct of this research project, you may contact:*

*Arne Dietrich: [ad12@aub.edu.lb](mailto:ad12@aub.edu.lb), 01-350000 Ext. 4369*

Areej W. Yehia: [awy01@aub.edu.lb](mailto:awy01@aub.edu.lb), 70-038955

**Oral Consent to Participate in this Research Project:**

*By orally consenting you agree to participate in this research project. The purpose, procedures to be used, as well as, the potential risks and benefits of your participation have been explained to you in detail. You can refuse to participate or withdraw your participation in this study at anytime without penalty. This information sheet is for you to keep.*

*I have read and understand the above information. I agree to participate in the research study.*

---

Printed Name of Research Director

---

Signature of Research Director

---

Date

---

---

**INSTITUTIONAL REVIEW BOARD APPROVAL STAMP:**

Appendix B

Questionnaires for First Session

**American University of Beirut**

P.O. Box 11-0236

Riad El Solh, 1107 2020

Beirut, Lebanon

**Research Project**

**General Information**

Participant's Name: \_\_\_\_\_

Email: \_\_\_\_\_

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Please fill out the following:

Age: \_\_\_\_\_

Gender:       Female       Male

Major: \_\_\_\_\_

First Nationality: \_\_\_\_\_ Second Nationality: \_\_\_\_\_

How many years have you lived in Lebanon? \_\_\_\_\_

Do you have normal vision (with correction)?       Yes       No

Sect:     Maronite     Orthodox     Sunni     Shiite     Druze     Armenian   

Other, please specify \_\_\_\_\_

Please list three hobbies:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**American University of Beirut**

P.O. Box 11-0236  
Riad El Solh, 1107 2020  
Beirut, Lebanon  
**Research Project**  
**Handedness Scale**

Participant's Name: \_\_\_\_\_

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Please indicate below which hand you ordinarily use for each activity.

With which hand do you:

- |                                    |         |          |           |
|------------------------------------|---------|----------|-----------|
| 1. draw?                           | 1. Left | 2. Right | 3. Either |
| 2. write?                          | 1. Left | 2. Right | 3. Either |
| 3. use a bottle opener?            | 1. Left | 2. Right | 3. Either |
| 4. throw a snowball to hit a tree? | 1. Left | 2. Right | 3. Either |
| 5. use a hammer?                   | 1. Left | 2. Right | 3. Either |
| 6. use a toothbrush?               | 1. Left | 2. Right | 3. Either |
| 7. use a screwdriver?              | 1. Left | 2. Right | 3. Either |
| 8. use an eraser on paper?         | 1. Left | 2. Right | 3. Either |
| 9. use a tennis racket?            | 1. Left | 2. Right | 3. Either |
| 10. use a scissors?                | 1. Left | 2. Right | 3. Either |
| 11. hold a match when striking it? | 1. Left | 2. Right | 3. Either |
| 12. stir a can of paint?           | 1. Left | 2. Right | 3. Either |



Appendix C

Questionnaires for Second Session

**American University of Beirut**

P.O. Box 11-0236

Riad El Solh, 1107 2020

Beirut, Lebanon

**Research Project**

**General Information 2**

Participant's Name: \_\_\_\_\_

Day: \_\_\_\_\_

Time: \_\_\_\_\_

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The effect of some prescribed medication, recreational drugs and alcohol can produce inaccurate data in the EEG measure. If you have taken recreational drugs, any prescribed medication that affects your cognitive process, and/or alcohol for the past 24hrs please do not participate in the study.

Appendix D  
**American University of Beirut**  
P.O. Box 11-0236  
Riad El Solh, 1107 2020  
Beirut, Lebanon  
**Research Project**  
**Sectarianism Scale**

Participant's Name: \_\_\_\_\_

The following statements describe how one experiences internal (thoughts, feelings, sensations, etc...) and external events in everyday life. Please read the items below carefully and answer by circling the number that best describes the frequency each item is experienced over the **past week**.

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
	1	2	3	4	5
					<b>SD   D   N   A   SA</b>
1- I am proud to belong to my sect	1	2	3	4	5
2- My sect can serve Lebanon better than any other sect	1	2	3	4	5
3- Any governing authority need to take the interests of my sect into consideration	1	2	3	4	5
4- I have a strong connection to my sect	1	2	3	4	5
5- My sect should have a larger proportion/quota of government	1	2	3	4	5

**American University of Beirut**  
P.O. Box 11-0236  
Riad El Solh, 1107 2020  
Beirut, Lebanon  
**Research Project**  
**Moral Identity Scale**

Participant's Name: \_\_\_\_\_

Listed below are some characteristics that may describe a person:

- Caring
- Compassionate
- Fair
- Friendly
- Generous
- Hardworking
- Helpful
- Honest
- Kind

The person with these characteristics could be you or it could be someone else. For a moment, visualize in your mind the kind of person who has these characteristics. Imagine how that person would think, feel, and act. When you have a clear image of what this person would be like, answer the following questions.

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>		
	1	2	3	4	5		
			SD	D	N	A	SA
1. It would make me feel good to be a person who has these characteristics.	1	2	3	4	5		
2. Being someone who has these characteristics is an important part of who I am.	1	2	3	4	5		
3. I would be ashamed to be a person who has	1	2	3	4	5		

these characteristics.

4. Having these characteristics is not really

important to me.

1 2 3 4 5

5. I strongly desire to have these characteristics.

1 2 3 4 5

6. I often wear clothes that identify me as having

these characteristics.

1 2 3 4 5

7. The types of things I do in my spare time (e.g.,

hobbies) clearly identify me as having these

characteristics.

1 2 3 4 5

8. The kinds of books and magazines that I read

identify me as having these characteristics.

1 2 3 4 5

9. The fact that I have these characteristics is

communicated to others by my membership in

certain organizations.

1 2 3 4 5

10. I am actively involved in activities that

communicate to others that I have these

characteristics.

1 2 3 4 5

## Appendix E

### Debriefing Document

#### **American University of Beirut**

P.O. Box 11-0236

Riad El Solh, 1107 2020

Beirut, Lebanon

#### **DEBRIEFING DOCUMENT**

Research Project: *Discrepancies between explicit sectarian attitudes and implicit discriminatory behavior in a Lebanese student sample: An ERP study using the Ultimatum Game.*

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*Thank you for participating in this research study.*

*We sincerely apologize for initially obscuring the real purpose of the study. Not using active deception (i.e. providing the study's real aim or simply withholding the real purpose of the study) would have been problematic. Results of laboratory experiments (as opposed to observational research) are often influenced by the fact that participants are keenly aware of their participation in controlled (psychological) research.*

*Furthermore, the psychological variables (e.g. implicit behavior) of our interest are sensitive to participant effects in a lab setting and need to be kept independent and unattended to ensure valid conclusions.*

*Deception was necessary to prevent self-presentation biases (in response to demand characteristics of the experiment) from distorting results and jeopardizing the validity of the conclusions. Simply not withholding the real aim of the study may have resulted in responses that are dependent on each participant's independent expectations regarding the true aim of the study; each participant may try to discern the real purpose of the study independently and respond accordingly.*

*As such, it is necessary that all participants receive uniform information ("deception") regarding the true purpose of the study. This limits the effects of confounding factors (i.e. self-presentation biases, personal expectations, and demand characteristics) from affecting participant responses differently. Therefore, active deception was not intended to embarrass anyone but to prevent distortion of results and to ensure that the validity of conclusions would not be jeopardized.*

#### **Real purpose of the study**

*On one hand, Lebanese youth endorse explicit sectarian attitudes. On the other hand, they may behave in a way that is in favor of their own sect. This phenomena is called ingroup favoritism. Research has shown that implicit prejudicial attitudes impact implicit behavior regardless of explicit attitudes. If implicitly driven, then ingroup favoritism may not be consistent with the explicit sectarian attitudes. People might not be aware of behaving in favor of their sect even if they think of themselves as non-sectarian.*

*The true purpose of the study is to examine the discrepancies between explicit sectarian attitudes and implicit discriminatory behavior. To test for the latter, some of you were asked to play the ultimatum game with someone from their own sect while others played*

*with a person who did not belong to their same sect. The characters and trials in the ultimatum game were predetermined by the experimenter for the sole purpose of testing the hypothesis. The decisions that you made in the game measure implicit behavior. These results were compared to the explicit attitudes measured by sectarian self-report scale. The brain activity measured by the EEG was essential to correlate implicit prejudicial attitudes (i.e. biases toward own sect) and implicit behavior.*

**Benefits**

*Knowing the discrepancies between explicit attitudes (i.e. how much you think you are sectarian) and implicitly driven behavior (i.e. how much you act in favor of your sect, without you realizing) can help scientifically understand the phenomenon of sectarianism. With this in mind, certain measures can be taken to reduce it's presence among the Lebanese youth.*

**Questions and Concerns**

*If you have any other concerns or questions about your rights as a research participant, or to report a research related injury, you may contact the Institutional Review Board*

Institutional Review Board, [irb@aub.edu.lb](mailto:irb@aub.edu.lb), 01-350000 Ext. 5543/5540

*If you have any concerns or questions about the conduct of this research project, you may contact:*

Arne Dietrich: [ad12@aub.edu.lb](mailto:ad12@aub.edu.lb), 01-350000 Ext. 4369

Areej W. Yehia: [awy01@aub.edu.lb](mailto:awy01@aub.edu.lb), 70-038955

*If you are interested in learning about the outcome of the study, you may contact Arne Dietrich and/or Areej Yehia (contact information above). After data analysis is completed, a summary of the results could be emailed to you upon your request.*

**Written Consent to Include Your Data in the Study:**

*By consenting you agree to include the data collected from you in this research project. The purpose, procedures and potential risks/benefits of your participation have been explained to you in detail. You can refuse to have the data collected from you included in the study and it will be destroyed immediately. You will be given a copy of this debriefing form.*

*I have read and understood the above information. I give permission to have my data used in this research project.*

---

Your Printed Name

---

Your Signature

---

Today's Date

Printed Name of Research Director

---

Signature of Research Director

---

Today's Date



Appendix F

Demographical Information per Groups

Condition	Demographics		N	%
Control	Gender	Male	4	8.89
		Female	11	24.44
	Sect	Christian Maronite	5	11.11
		Christian Orthodox	1	2.22
		Muslim Shiite	2	4.44
		Muslim Sunni	5	11.11
		Druze	2	4.44
Ingroup	Gender	Male	9	20
		Female	6	13.33
	Sect	Christian Maronite	5	11.11
		Christian Orthodox	0	0
		Muslim Shiite	4	8.89
		Muslim Sunni	3	6.67
		Druze	3	6.67
Outgroup	Gender	Male	5	11.11
		Female	10	22.22
	Sect	Christian Maronite	5	11.11
		Christian Orthodox	1	2.22
		Muslim Shiite	3	6.67
		Muslim Sunni	4	8.89
		Druze	2	4.44



## Appendix G

	<b>1 Match found!</b>	
Name: John Mathew	Ok	Name: (Hidden)
Sect: Maronite	<b>Mismatch</b>	Sect: (Hidden)
Experiment: 2	Match	Experiment: 2
Participant number: 26	<b>Mismatch</b>	Participant number: 14
Semester: Fall 2013	Match	Semester: (Hidden)
Session: 0045	Match	Session: 0045
Lab: Jesup 107B	<b>Mismatch</b>	Lab: Nicely 207

*Figure 5.* Example of a stimulus in an out-group condition