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HOW THE CHOICES OF LEADERS ARE INFLUENCED BY INFORMATION AND THE LEADERS' IMPACTS ON CONTRIBUTIONS AND WAGES.

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ABSTRACT

This thesis highlights the significant importance of leadership to organizational settings in which group members' behaviours are driven by social dilemma. Using experimental methodology, we manage to investigate how the choices of leaders are influenced by the provided information about leadership candidates and how selected leaders affect group members' contributions and wages. First of all, we find that group members offer higher salaries to leaders, who are able to demonstrate their fluent communication, need for achievement and affiliation, aversion to risk and authenticity in the written abstracts. Those leaders are also found to be less neurotic, open to experience and more self-esteem, loss-averse. Secondly, output distribution behaviour of selected group leaders is found to be positively influenced by the group members' contributions. In addition, group members are found to be more satisfied with leaders that allocate more final outputs. Thirdly, we discover that efficient leaders' communication is featured by high level of affiliation in general. Besides, when communicating with a group of followers, leaders' languages are found to be friendlier, more distinctive and decisive while their languages tend to be more emotional, achievement-oriented and less self-focused, leisure-related when leaders communicate with an individual member. Fourthly, we identify key traits of efficient leaders, which are less neuroticism, Machiavellianism and more egalitarianism and ambiguity-seeking. Among those traits, leaders with high egalitarianism and low Machiavellianism are found to satisfy group members the most. Also, male leaders are found to be more ambiguity-seeking than female ones.

Chapter 1: The influence of leader's authority over followers' cooperation and team performances

I. Introduction

Whether leadership matters in corporate context remains as one of the most controversial issues in management study (Wasserman, Nohria, and Anand, 2010). While Lunenburg and Ornstein (2013) and Ahmet (2015) emphasise the essence of leader in setting strategic visions for subordinates to follow with a view to achieving collective goals and triggering their incentives to exert more effort on common activities, Day and Lord (1988), Meindl and Ehrlich (1987), Meindl, Erlich and Dukerich (1985), Calder (1977) and Pfeffer (1977) argue that executive leadership is an insignificant factor of firm's success. Criticism of leaders' significance is further made by Meindl (1990) that individuals tend to attribute leadership and attractiveness to people being in charge of organisational outcomes even though such attribution is not well proved or warranted. This conflict between researchers has greatly complicated indications for practice and theoretical development of leadership (Day and Lord, 1988). Therefore, in our study, we want to provide further understanding for the current debate and explore the positive impacts of leadership on organisational performance.

Since the 1930s, the concept of leadership has been confused with management although there are a large number of written books, chapters, and even articles targeting at distinguishing among them (Hickman, 1998). Even until 1980s, the perception towards leadership as good management was still deeply rooted in papers of Smith and Peterson (1988), Badaracco and Ellsworth (1989), and Cohen (1990). Jacobs (1970) is among earliest attempts to distinguish leadership from management. He points out that management lies in the relationships among positions within an organisation, and is derived from the agreed expectation for the incumbent role involved while leadership is an interaction between people in which an individual presents information in such a way that makes others persuaded. Leadership, on the other hand, involves setting visions and encouraging people to contribute to those visions. It is also about persuading, but not commanding, followers to look in the same direction. In Zaleznik's opinion (1977), leaders, to a certain extent, bear more resemblances to artists and scientists than managers do.

From economic point of view, the study of leadership is fundamental to understanding firms and governments (Weber, 2015), which in turn helps scientists explain and improve corporate profitability and efficiency of economic policies. However, similar to management studies, some economists still cast doubt on the decisive role of leaders to the economy and society. Weber (2015) illustrates this suspicion of economists by providing an example of economics courses students used to take at universities where the role of leaders is hardly mentioned. Even if it is discussed, leadership, in these courses, is simply described as a manager who is responsible for setting payrolls and obtaining workers' efforts. Additionally, in

governmental context, Weber (2015) realises that there is almost no highlight on leaders' criticality. It is only until recently that leadership starts to become a vibrant research topic in the field of behavioural and experimental economics. Many studies have been conducted on the impact of leadership on organisational outcome and cooperativeness and most of them agree that, in coordination games, performances of groups with leaders are better than those of groups without leaders (Wilson and Rhodes, 1997; Moxnes and Heijden, 2003; Rivas and Sutter, 2011; and Dannenberg, 2014). Moreover, experimental evidence suggests that leaders with predisposed powers can boost collective outcomes even higher and more sustainably through time. In the current research, five out of fourteen participants are randomly selected as potential leaders in each session and group members have to select their preferred leaders through a salary offers mechanism at the beginning of each 15 periods. Depending on different treatments, leaders are endowed with no power or with the power to distribute periodic final outputs from the public good game.

There are different ways for a leader to set her influence on group members and, therefore, group's productivity. In this chapter, we mainly focus on allocation authority as it is a critical component of leadership (Drouvelis et al., 2017; Stoddard et al., 2014; Abeler et al., 2010; Heijden et al., 2009; Yukl, 1989; French and Raven, 1959) and an important principle of path-goal and operant conditioning approaches to leadership, which postulate that the ability to make contingent rewards in light of followers' performances is detrimental to leaders' success in improving followers' behaviour (Jago, 1982; Zhu et al., 2012; Nguyen and Chmura, 2020). Heijden et al. (2009), Abeler, Altmann, Kube, and Wibral (2010), Drouvelis, Nosenzo, and Sefton (2017) examine the difference in collective outcomes between groups without leaders and groups with leaders endowed with the right to redistribute final output or wages. They consistently find that groups with leaders responsible for determining the allocation of output outperform groups without leaders. This indicates that successful leadership can be achieved by employing discretionary distribution power to monitor members' effort. However, there still exist contradicting opinions on the effect of allocation authority over followers' performances. Nosenzo and Sefton (2014) point out that centralised leadership may not be efficient in situations where group members have heterogeneous perspectives towards leader's quality and leader does not practice her allocation authority effectively to incentivise subordinates and only wants to retain common benefits for herself. This argument is supported by Levati et al. (2007). In our research, we want to resolve this contradiction and further highlight the leader's importance to organisational success.

Characteristics of the leader also play a decisive role in the group's efficiency and cohesion. Kirpatrick and Locke (1991) promote seven key qualities of an effective leader including drive, desire to lead, self-confidence, honesty and integrity, cognitive ability and knowledge. In a similar manner, Capowski (1994) discusses a list of ten essential attributes a leader in the "new millennium" needs to possess. It comprises vision, integrity, trust, selfishness, commitment, creative ability, toughness, communication, risk taking, and visibility. The original papers of Howell and Frost (1989), House and Howell (1992) might be the closest to our study as they are within a

few and foremost studies that thoroughly identify characteristics of charismatic leaders, classify this leadership type into two sub-categories of personalised and socialised, as well as describe how this type of leader enhances individual commitment to the mission. It is found that, under charismatic leader, no matter how high or low productivity participants may demonstrate, they all have high task performances and fast adjustments to the leader and the group as well (Howell and Frost, 1989). In addition, Messick et al. (1984) and Rutte and Wilke (1985) experimentally find that leaders with high egalitarianism serve as a good solution to common resource distribution problem. This finding applies to our study in the sense that if group leaders allocate output to members on a fair and efficient basis they likely manage to incentivise followers to contributes more to the public good and eliminate free-riding behaviour.

Leaders in existing experimental studies can be selected either exogenously or endogenously. Dannenberg (2014) find that groups with exogenous leaders, who lead by example, outperform those with no leaders. Similar result is reported by Levati, Sutter and van De Heijden (2007). Nevertheless, this procedure of selecting leader is criticised for not being democratic and may result in less efficient outcome than the method where leaders are legitimately elected by group members (Hamman, Weber and Woon, 2011, and Brandts, Cooper and Weber, 2015). In their recent work, Drazen and Ozbay (2016) prove that elected leaders tend to act in favour of voters, which contradicts assumptions made by citizen-candidate model. Hence, to offset weaknesses of exogenous leadership, we combine random selection of leaders with salary offering process, which bears a resemblance to voting mechanism, in our research. It is important to note that, prior to election stage, group members have a chance to read potential leaders' written abstracts to obtain more knowledge of them and facilitate the selection of preferred leaders later on. Written abstracts in our design are similar to resumes submitted to employers when job seekers are applying for vacancies. According to Arnulf, Tegner and Larssen (2010), resumes present sufficient and reliable information about an individual and, therefore, are useful for recruiters to predict future performances of candidates after being accepted onto relevant positions. They also make screening process of recruitment staffs in corporations become a lot more efficient and less time-consuming.

The public good game (Fehr and Gächter, 2000) is relevant to our study as it has been long used in behavioural and experimental economics to examine social dilemmas and organisational problems. Furthermore, our research is inspired by the incentive to maximise public good game's payoffs, which then can be applied to the context of organisation, institutions, companies or household businesses (Brandts et al., 2015). Also, in a closely related paper to our research, De Heijden, Potters, and Sefton (2009) employed public good game design to distinguish the outcome of groups with revenue shared equally among members from that of groups with revenue shared by leaders. In its original design, public good game consists of four players each of whom is endowed with an amount of funding at the start of the experiment. Participants have to decide how much they are willing to contribute to the public good, which is then multiplied by 1.5 (Ertac and Gurdal, 2012). The final output from the game is equally redistributed to

all group members, resulting in an MPCR of 0.5, no matter how much they donate in the contribution stage. Marginal per capital return, or MPCR, is a measure of what an individual gets back from one-unit contribution to the public good (Davis and Holt, 1993).This feature of the game raises an issue of free-riding in which selfish players are benefited whilst they give none to the common good. Assumptions of rationality and money-maximizing agents dictate that human beings (homo economicus) act selfishly and, therefore, contribute nothing to the public good while experimental economists find that participants in public good experiments contribute half of their wealth on average (Ramalingam et al., 2016). Leader-followers setting is a variation of public good game and employed in the current study to examine the influence of leaders on followers' cooperative behaviour. In this setting, a participant is either exogenously or endogenously selected as leader while the other three play as followers. The leader's main goal is to incentivise group members to contribute more to the public good by communicating with them (Levy et al., 2011; Hamman et al., 2011; Oprea et al., 2014) or determining the allocation of final output (Heijden et al., 2009; Drouvelis, Nosenzo and Sefton, 2017).

Our research firstly elicit individual personality traits and capacities by deploying a wide range of tests such as Big Five (John and Soto, 2017, Cognitive Reflection Test (Frederick, 2005), Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995), math skill test (Gaudeul and Keser, 2017), Holt and Laury test (Holt and Laury, 2005), loss aversion test (Brink and Rankin, 2013), ambiguity aversion (Krahnen, Ockenfels, and Wilde, 2013), social value orientation (Murphy et al., 2011), Raven test (Raven and Court, 1998), Machiavellianism test (Christie and Geis, 1970), BFMS test (Bartling et al., 2009), social intelligence test (Khorashad et al., 2015). Next, we divide participants into groups of three and ask them to make salary offers to randomly selected leaders. After potential leaders decide which group to lead, they will proceed to the public good game with their group members. Leaders will not make any contribution but they are responsible for allocating groups' final output back to members in the later stage. At the end of each experimental period, we ask participants in each group to indicate their happiness or satisfaction with the group leader. Especially, in 15^{th} period, group members also have chance to remove or keep their leader depending on their performance. There will be a game restart after the 15^{th} period and subjects are not informed about this in advance. We expect, from this experimental design, to have a better insight into leader-member interaction and whether leader with redistribution authority can increase collective productivity as well as how s/he utilises that power. The research questions for this chapter are, therefore, presented as the following:

_ Will groups with passive leaders be more efficient than groups without leaders?

_ What are individual traits that drive contribution behaviour of group members?

_ What are determinants of group leaders' allocation behaviour?

_ How are groups' performances influenced by followers' salary offers to leadership candidates?

II. Literature

Our study is a continuation of the emerging flow of studies on leadership in experimental economics. As mentioned above, economists have focused on the influence of leaders in organisations for the last few decades. Nonetheless, there is little literature on how powerful the leader with output allocation authority is. The closest papers to our research can be of Heijden et al. (2009), Stoddard, Walker and Williams (2014), Drouvelis, Nosenzo, and Sefton (2017), in which they investigate if the installation of leaders into groups is able to reduce or remove the free-riding problem by comparing performances of benefit-sharing institution with leader determining shares institutions. It is consistently found in Heijden et al. (2009), Stoddard, Walker and Williams (2014), Drouvelis, Nosenzo, and Sefton (2017) that, groups with leaders determining the output allocation have much higher average team effort. Moreover, within leader determining shares institution, successful leaders tend to allocate output to members as much as they allocate to themselves in order to recognise the effort members exert (Heijden et al., 2009). Study of Rivas and Sutter (2011) relates to our research in the sense that it shows how leader with rewarding power influence the average contribution level of group members to the public good. In their 'REWARD' treatment, after all group members have made their contributing decisions, leader observes all contributions and decides which member is worth receiving 10-ECU (experimental currency unit) reward. The decision to reward a member is not compulsory for the leader and it is noticeable that it will cost the leader and other non-rewarded members 2 ECUs each if a member is chosen to be rewarded.

However, none of the above studies has examined the personalities and abilities of leaders to see how these factors determine their leading capacity as well as their redistribution behaviour. In addition, characteristics of group members also play an important part in group's overall performance, leader's payoffs and, hence, leader's redistribution of generated output. This aspect of group members, nonetheless**,** has been underrepresented in existing literature as well Besides comparing the difference in performances between groups with and without leaders as well as between groups with leaders having no power and groups with leaders having allocation authority, we also show how individual traits determine group members' contribution and leaders' allocating output. Lonnqvist, Verkasalo and Walkowitz (2011) and Kalshoven, Hartog, and Hoogh (2011) are related to our research as they manage to correspond personalities with individual cooperation and fairness, which are potential for explaining team performance and reciprocal behaviour of leaders.

To understand characteristics and ability traits of participants, we employ a wide range of tests varying from Big 5, psychopathy, cognitive ability to mathematic

skill, risk preferences, fluid and social intelligence, and social orientation. Big Five test (Costa and McCrae, 1992) comprises Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience. Neuroticism reveals one's emotional stability and low anxiety even though s/he suffers from negative effects such as anger, sadness, guilt and so on (Pervin, 1989; Barrick and Mount, 1991). Extraversion tells us how much a person is sociable, confident, energetic and talkative (Greenidge, 2013). Conscientiousness refers to how much an individual is organised, determined, purposeful, plan and achievement oriented, efficient, thorough, responsible and reliable (Burger, 2008; Hofstee et al., 1992). Agreeableness concerns with the cooperative, considerate and friendly aspects of individual personality (Greenidge, 2013). It is described as a personality dimension that is most related to interpersonal domain (Graziano and Eisenberg, 1997). Last but not least, the Openness to Experience relates to one's curiosity of intellectuality, imagination and creativity (Burger, 2008; John and Srivastava, 1999). It is found that, in an organisation, people with high Openness to Experience exhibit more creativity and have better job outcomes (George and Zhou, 2001). In the current chapter, after collecting data from experiments, we calculate Cronbach's alphas for each dimension of the Big Five test to check if it provides a stable measure of personality traits over time. We find that the Cronbach's alpha for openness to experience, conscientiousness, extraversion, agreeableness and neuroticism are 0.70, 0.65, 0.67, 0.76 and 0.62, respectively. All of coefficients of reliability are larger than 0.60, so we conclude that the Big Five test is reliable for measuring participants' personalities.

Lange and Osterheider (2008) define psychopathy as a personality disorder characterised by selfishness, misleading conduct, and a reckless intention to exploit other people. Individuals with psychopathy, therefore, have a tendency to perform antisocial behaviour like deceiving or showing no collaboration with others. In contrast, Harpending and Sobus (1987) suggest that psychopathy is an advantageous strategy for us to adapt to challenges in life. In order to assess one's psychopathy, Psychopathy Personality Inventory (Lilienfeld and Andrews, 1996) and Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995) have been widely applied. Psychopathy Personality Inventory (PPI) is developed from a wide range of concepts and theories on psychopathy and comprises 160 items Levenson Primary and Secondary Psychopathy Scales, on the other hand, is a 26-item self-report measurement and divided into two main sub-scales: (1) Primary Psychopathy (16 items) and (2) Secondary Psychopathy (10 items).

Cognitive ability is a comprehensive set of skills including gathering, processing and disseminating information, and learning new knowledge (Zaccaro, 2001). It accounts for a large portion of frequent activities a leader is supposed to engage in (Carroll and Gillen, 1987). Kickul and Neuman (2000) find that cognitive ability positively correlates with leadership and helps explain the team performance. These results are in line with Bass (1990), Guzzo and Salas (1995) and Heslin (1964). To assess one's cognitive ability, Frederick (2005) proposed a three-item measure to assess one's cognitive ability, which was so-called as Cognitive Reflection Test (CRT), after he was aware that people tended to neglect the importance of IQ on human's judgment and

decision making. The CRT's scores can help anticipate kinds of choices featuring in tests of theories of decision making (Frederick, 2005). It is found that the CRT result differs between sexes, time preferences, as well as risk preferences.

The relationship between math score and leadership has been studied for the last haft century. Kuhn and Weinberger (2005) suggest that the association between leadership and math test result is not significant. They show that although there is a strengthened association between math scores and leadership during the period of 1972-1982, the correlation between them, in general, is insignificant. In a more recent study, however, Gaudeul and Keser (2017) apply mathematic tests (addition, subtraction, multiplication and division) to choosing leaders for public investment game where experimental participants view mathematical ability as relevant to making investment decisions on the behalf of other people. They conclude that people, who have math scores lying in the top half, are more likely to be voted to become leaders. Nonetheless, these individuals, after being elected, have a tendency to allocate more of the surplus generated by the group to themselves because they overstate the importance of their decision-making role.

Risk preferences have been explored to affect one's decision-making process and, hence, determine an individual's leading capacity. In management science, McCrimmon and Wehrung (1990) demonstrate that the most successful executives are least averse to risk. Similar result is reported by Barnes, Reed and Jessup (2010) in which entrepreneurs are found to be risk takers. In experimental economics, Ertac and Gurdal (2012) show that individuals, who are willing to become leaders, are more risk-seeking than those that are unwilling to make decisions on behalf of their groups. However, there are contrasting studies where leadership is proved to have positive link to risk aversion. Webster (1977) suggests that entrepreneurs are not more risk-seeking than the average population while Amihud and Lev (1981) imply that as managers' incomes associate with companies' profitability they become risk averse when risks relate to corporate performances (Wiseman and Mejia, 1998).

In order to elicit individual attitudes towards risk, two most popular methods are introduced by Holt and Laury (2005) and Dohmen et al. (2011). In Holt and Laury (2005), there is a menu of ordered lottery choices each of which contain two options of a high risk gamble (A) and a low risk gamble (B). The point at which an individual switches from risker option (A) to safer option (B) reveals his or her risk aversion. The sooner s/he switches from A to B, the more risk averse that individual is. The problems with risk elicitation test of Holt and Laury (2005) are that test takers may switch back and forth between two columns A and B or make choices in the opposite direction (starting with column B and then switching to column A). These can lead to inaccurate interpretation of individual risk preferences and Jacobson and Petrie (2009) apply single switching point (SSP) as a solution to Holt and Laury (2005) test's drawbacks. However, Csermely and Rabas (2016) argue that the application of SSP can cause the test potential boredom and ignore one's indifference between given choices (Andersen et al., 2006).

In Dohmen et a. (2011), risk references are elicited in a simpler way where participants are requested to indicate their willingness to take risk on a scale of 0 to 10

with 0 equal to 'not at all willing to take risks' and 10 equal to 'very willing to take risks'. Dohmen et al. (2011) argue that pre-existed literature on measuring risk preferences using survey questions produces mixed results while one using real money at stake is costly and difficult to work well on large samples. Hence, they document an approach to measuring risk attitudes by asking subjects about a judgment on how they are willing to take risks. Dohmen et al. (2011) manage to demonstrate that their approach is easy to use, less costly and performs well on large representative numbers of observations. Furthermore, it complements lottery-type risk elicitation tests as well as exhibits behavioural validity. Also, Dohmen et al. (2011) show that demographic factors, such as age and gender, have certain influences on individual willingness to take risks.

Studies on ambiguity aversion trace their roots back to the early of 1920s with researches on decision made under uncertainty and risk of Knight (1921) and Keynes (1921). Later on, risk aversion is discussed in Savage (1954) and Neumann and Morgenstern (1944) who are the fathers of modern decision theories. Since then there have been an increasing number of articles exploring the effects of ambiguity aversion on decision making process. Gangadharan and Nemes (2009) and Dannenberg et al. (2015) highlight that that ambiguity aversion decreases cooperation in public good game while Levati, Morone and Fiore (2009) show that limited information about value of the common good results in deteriorating average contributions across most of periods.

In order to measure people's aversion to ambiguity, Krahnen, Ockenfels, and Wilde (2013) develop a lottery-type test in which a list of binary choices is presented to subjects and they have to choose between risky payoffs (with associated probabilities) (column A) and uncertain payoffs (without associated probabilities) (column B) in each decision. Additionally, it is noticed that payoffs in column A vary across choice list while those in column B remain unchanged. The points at which test takers switch from column B to column A determine their aversion to ambiguity. In particular, the sooner the subjects change side, the more averse to uncertainty they are.

Loss aversion is well documented by Kahneman and Tversky (1979) and dictated as individuals experiencing greater disutility from losses than utility from equivalent gains. In experimental studies, there are mixed findings on the impacts of loss aversion on decision makers. McCarter et al. (2010) prove that loss prospect discourages individuals from contributing to the common good. Similarly, Sell and Son (1997) state that loss aversion facilitates sustaining resource goods rather than public goods. However, Dreu and McCusker (1997) argue that people with loss aversion are not necessarily uncooperative all the time and show that pro-social individuals collaborate with each other even in a loss frame.

Brink and Rankin (2013) are inspired by Holt and Laury (2005) and design a measure to elicit individual loss aversion with ten paired lottery choices. Participants are required to choose between two options in each choice where option A consists of 50% chance of positive outcome and 50% of negative outcome and the size of potential loss increases across the choice list. Option B, on the other hand, has 50% chance of positive payoff and 50% of negative one but the size of its loss stays constant

throughout choices. Interpretation of Brink and Rankin (2013) test bears some resemblances to traditional lottery-type risk elicitation test in the sense that experimenter observes the point at which participants switch from column A to column B to decide their aversion to loss. In specific, if an individual change side earlier than another, s/he is said to be more loss averse than the other.

Social value orientation (SVO) is conceptualised as a continuous measurement of the degree to which an individual concerns for other people (Murphy and Ackermann, 2014). It has been long studied in psychology and behavioural sciences under different names like social preferences, welfare trade-off ratio or altruism. The reason for this lexical variety is due to the fact that understanding human's self-interest is so appealing to social scientists that they have conduced plenty of researches on it by employing a variety of measures and methods (Murphy and Ackermann, 2014). Altruism, pro-sociality, individualism and competitiveness are four categories of social value orientations. De Cremer (2000) show that pro-social people contribute more to the public good and concern about maximizing joint outcomes as well as restoring equality among parties simultaneously. These findings are in line with Van Lange, Liebrand and Kuhlman, 1990), which highlight that pro-socials consider cooperation as rational choice and pro-selfs, who are competitive or individualistic or both, view cooperation as irrational choice.

Murphy, Ackermann and Handgraaf (2011) introduce a new approach with more advantages than pre-existing tools to measuring social value orientation. The test comprises 15 items, each of which requires the subject to select an allocation of points between herself and another anonymously matched individual. Answers from participants are then input into the following formula to come up with SVO index:

$$SVO^{o} = \arctan\left(\frac{\bar{A}_O - 50}{\bar{A}_S - 50}\right)$$

where, $\bar{A}_O$ is the mean allocation for other.

$\bar{A}_S$ is the mean allocation for self.

Murphy, Ackermann and Handgraaf (2011) provide guidelines on how to determine which type of social values a participant uphold based on the scores computed from above formula:

- Altruism: $SVO^{o} > 57.15^{o}$
- Pro-sociality: $22.45^{o} < SVO^{o} < 57.15^{o}$
- Individualism: $-12.04^{o} < SVO^{o} < 22.45^{o}$
- Competitiveness: $SVO^{0} < -12.04^{0}$

Zaccaro et al. (1991) describe social intelligence as the capability to accurately perceive social requirements and select proper behavioural responses. It is explored to be crucial for leadership and constructs competencies to interpret and resolve problems (Zaccaro et al., 1991; Mumford and Connelly, 1991). The test used to elicit one's social intelligence is known as 'Reading the Mind in the Eyes Test' as participants have to look at photos of strangers' eyes and choose which words correctly describe

what people in the photos feel or think (Khorashad et al., 2015). In its original design, the test has two possible answers for each photo (Cohen et al., 1997) while, in its revised version (Cohen et al., 2001), there are four possible choices for each photo. In our study, we employ the latter, which consists of 36 items, to extract social intelligence of participating individuals. The final score is calculated as the total number of correct answers.

Social preferences, according to Capraro et al. (2017), are divided into spitefulness, egalitarianism and efficiency motives. Spitefulness refers to one's preference for maximizing own payoffs while egalitarianism refers to individual preference for minimizing difference in payoffs between self and the other. Efficiency motive is dictated as one's preference for maximizing the total payoffs of both parties. Beside three main social motives above, self-interest, which is described as the preference for maximizing one's own absolute payoff irrespective of others, is also considered when coping with material resources (Capraro et al., 2017). While egalitarianism is dictated as one of the five facets of servant leadership (Mittal and Dorfman, 2012), social efficiency is said to be achievable through cooperation (Capraro et al, 2017). Also, Marcus et al. (2014) and Hill and Vonk (2015) document that spitefulness is positively correlated with psychopathy, Machiavellianism, narcissism (dark triads) and aggression, which are proved in a vast literature to have negative influences on leadership ability. Additionally, Marcus et al. (2014) state that spitefulness relates to exploitativeness and entitlement rather than leadership. In terms of self-interest motive, selfishness is found in individuals, who are unwilling to become leaders, and downplayed as a vital trait of leadership (Gillet, Cartwright and Vugt, 2011).

Bartling et al. (2009) employ a menu of binary choices to elicit social preferences and inform participants that their decisions affect the final incomes of theirs and anonymously matched partners'. There are six binary choices in Bartling et al. (2009) test (later called as BFMS test) and each decision problem contains two options A and B, which reveal different social motives of experimental subjects. It is imperative to note that one motive can be associated with both options in a paired choice. According to Capraro et al. (2017), BFMS test is efficient for analysing social behaviour as it is not complicated or tricky for participants to complete.

Fluid intelligence or analytical intelligence refers to a person's ability to judge and find solutions to novel problems without relying on studied knowledge or past experience (Carpenter, Just and Shell, 1990). Analytical ability plays a decisive role to leaders' success and has been investigated in previous literature. McCleskey (2012) conclude that analytical intelligence is among critical cognitive abilities that effective leaders must possess. Additionally, Alon and Higgins (2005) state that successful leadership is a function of analytical intelligence, emotional intelligence, cultural intelligence and leaders' behaviour.

Raven Progressive Matrices test is one of the most popular methods to dictate individuals' analytical intelligence and firstly introduced by Raven (1962). The test is an item set of 36 visual problems that requires participants to select the correct answers. In our study, we pick out 18 problems to ask participating subjects. For each correct

answer, they receive one point while, for each wrong choice, they earn nothing. The final score equals to the total number of correct answers participants give.

Christie and Geis (1970) are among the first to document Machiavellianism, which is characterised by lack of morality, interpersonal connection and taking advantage of other people. In game theory, there are plenty of researches conducted on this characteristic and its influence on cooperation as well as leadership ability. Burks, Carpenter and Verhoogen (2003) prove that individuals with high Machiavellian score send less in trust game while Gächter et al. (2012) find that leaders with Machiavellianism contribute less to the public good. Drory and Gluskinos (1980) show that Machiavellian leaders tend to give more orders and demand assistance in adverse situations. They are also less directive than leaders scoring low on test for Machiavellianism.

Test for Machiavellianism is a 20-item psychometric test and created by Christie and Geis (1970). Each item in this test deploys a 7-level Likert scale to require subjects to indicate their agreement or disagreement on a given statement. When subjects agree on a statement that is Machiavellianism-oriented, their scoring is increased. On the other hand, when subjects agree on a statement that is not worded in Machiavellian direction, their scoring is decreased. By the end of the test, individuals with higher scores are said to be more Machiavellian than those with lower scores.

Leader selection is another element that also influences followers' behaviour and, hence, the overall performance of the group is leader selection mechanism. There are a vast number of studies recording the increased levels of contributions to public good games with the presence of leaders. Within these studies, leaders can be selected either exogenously or endogenously. Dannenberg (2015) exogenously or randomly selects a player to become group leader, who either contributes firstly to the public good or promises the amount s/he is willing to donate. It is found that groups contribute the most when the randomly selected leaders donate before members. This finding is supported by Moxnes and Heijden (2003). Rivas and Sutter (2009) employ endogenous leadership in their experimental study on the positive effects of voluntary leader on public good game. As compared to groups with no leaders and groups with exogenously forced leaders, overall contribution of groups with endogenous leaders is significantly higher. Besides voluntary leaders, voted leaders are another form of endogenous leadership. Brandts, Cooper, and Weber (2015) propose the concept of legitimate leader, who is elected by group members. Therefore, voted leaders are likely to be more effective and influential in terms of incentivizing followers to exert more efforts to common tasks. In comparison with exogenous leaders, endogenous ones are believed to be more credible and efficient (Brandts, Cooper and Weber, 2015). However, De Cremer and Van Dijk (2005) argue that leaders tend to be self-serving and allocate more collective benefit to themselves owing to feelings of entitlement. Similar result is reported by Gaudeul and Keser (2017). They observe that subjects, once selected as leaders, behave in a selfish way and obtain more output for themselves. Additionally, such individuals are mainly those with good mathematic ability. Therefore, it is worth learning more about the influence of leader selection methods on cooperativeness. In our study, we combine selecting leaders through a random process

with a salary offering mechanism with a view to offsetting weaknesses of exogenously forced leadership and reflecting the varied preferences of groups' members over potential candidates for leading positions. In addition, before potential leaders are randomly selected, each participant is asked to write a short paragraph of whether they want to become leaders and why they should be votes as leaders. Only paragraphs of randomly chosen leaders are shown to other participants so that they can have an insight into potential candidates for leading position. Brandts, Cooper and Weber (2015) discover that individuals with clear messages, which encourage effective collaboration, are more frequently chosen as leaders after analysing various types of messages sent out by participants.

As aforementioned, allocation authority is one of effective instruments leaders can employ to set their influences on followers' behaviour and, hence, final groups' outcomes. It has similarities and dissimilarities to the use of simple rewarding power to boost collective productivity. In terms of similarities, both instruments aim at providing benefits rather than punishments or sanctions for co-players. In regards to dissimilarities, allocation power is more efficient for several reasons. First of all, the use of rewards is effective only when players do not misuse them and sabotage collaboration (Nosenzo and Sefton, 2014). In contrast, allocation authority, when delegated to a monitor or leader, can solve problems of peer-to-peer incentives. Secondly, the impact of giving rewards can be small and unstable over time as resources for rewarding are limited and diffused among individuals while, in allocation paradigm, they are centralised to authorised figures, who can then impose larger incentives on generous contributors. Finally, as rewarding someone is costly, individuals only apply that instrument when the benefits from performing it exceed the benefits from not performing it. Otherwise, they would prefer someone else to bear the responsibility to encourage cooperation between group members (Elster, 1989). In general, concentrated incentive mechanism has multiple advantages over diluted one and is employed in various studies of Heijden et al. (2009) and Drouvelis, Sefton and Nosenzo (2017) in which leaders are randomly chosen and in charge of distributing communal benefits to team members. However, we cannot undermine some drawbacks of allocation power, which can negatively affect collective tasks, and are keen on detecting abusive acts of delegated figures. A typical example of such behaviours is that leaders retain most of groups' output at their disposal.

A public good game, by design, normally comprises four to six people, each of whom is assigned with a certain number of tokens initially. In the very next step of the game, they are asked to either donate their tokens to the group or keep the tokens for themselves. For each token contributed to the group, each of players including the contributor gains, for example, additional 0.5 tokens. Therefore, in total, if each member donates all they have, the maximum gain for the group should be 40 tokens (in case of four players). According to game theorists' prediction, as individuals are self-interest, no one will contribute to the public good or everybody will try to free ride on each other. On the contrary, from sociologic-psychologic perspective, there should be no conflict of interest between individuals and the group. As a consequence, each group member will contribute at least something (Ledyard, 1993). However, results

from experimental studies suggest that neither above idea is correct. There are cases where individuals contribute nothing while there are other cases in which individuals contribute 40%, 50%, 60% and up to all of they are endowed with (Chmura, 2018). Owing to the similarities between public good environment and organisational environment, the game has been greatly employed in experimental economics to study issues faced by organisations or corporations in reality such as employees' reluctance to exert efforts to maximise benefits and profitability for the companies or the CEO's impact on business outcome of the company.

III. Experimental Design

In our experimental design, we establish a setting that captivates interests of both economic and political entities: the observation of individual personality traits, the study of impact of voting procedure on group's performance, and the analysis of voters' behavioural shift in response to changes in leader's roles – from no leader to powerless leader and from leader with no power to leader with allocation authority. An individual can have strong, weak or no leadership traits at all. Voting procedure can have positive effect on collective outcome in the sense that group members, who are able to choose their preferred leaders, contribute more to the public good. It, however, can also have no influence on behaviour of followers. Besides, voters, after realizing the critical role of the leader, may shift their behaviour with the expectation that leader will redistribute more of the output.

We present our conducts of experiments and description of each treatment in the following paragraphs. Especially, we plot the voting mechanism, which is motivated by the selection of leaders in small organisations like start-up companies. CEOs or leaders in start-up firms are not necessarily the founders because they may not have good management skills or financial knowledge, which are important for running the companies. Therefore, founders often need to hire personnel with expertise in business management and finance to help them maintain the firms' daily operations so that they can focus on developing original products (e.g. software, mobile applications). Salary offering then becomes a decisive factor that founders of start-up businesses need to consider about when they screen for executives. The offered salaries should be appealing enough to attract strong applicants. In our experimental design, group members also have the right to make salary offers to leadership candidates. We reckon that our voting process is a highly democratic system in the sense that leaders will be rewarded by their teams, not only in the actions they take to increase contributions, but also in salary offers they receive from voters based on the skills they possess.

In total, we have conducted 7 treatments at the Centre for Research in the Behavioural Sciences (CRIBS) of the University of Nottingham in the UK. Zurich Toolbox for Readymade Economic Experiments or, in short, z-tree software (Fischbacher, 2007) and Qualtrics (Qualtrics, Provo, UT) are employed to run all experimental sessions. There are 186 participants joining in our experiments and they are recruited from the

University of Nottingham's pool of subjects using ORSEE (Greiner, 2015). Payoffs for participants depend on their performances and are calculated as 108 ECUs equal to £1. They are due to be paid in cash at the end of each experimental session. Details of 7 treatments are presented as the following:

- **Treatment 1 (baseline) (*LN*):** no leaders, 3-person groups playing public good game
- **Treatment 2 (*LP*):** voted leaders, and equal share of output among members
- **Treatment 3 (*LA*):** voted leaders, leaders allocate the final output to group members after observing the group's total contribution
- **Treatment 4 (*LCC*):** voted leaders, equal share of final output among members, leaders send common messages to group members
- **Treatment 5 (*LAH*):** voted leaders, leaders allocate the final output to group members, and they also see the level of happiness of group members with them.
- **Treatment 6 (*LIC*):** voted leaders, equal share of the final output among members, leaders send individual messages to group members
- **Treatment 7 (*LCCH*):** voted leaders, equal share of the final output among members, leaders see the overall happiness of group members with them and send the common messages

We then select relevant treatments to plug in our chapters. In this current study, we choose treatments *LN*, *LP*, *LA*, and *LAH* to make comparison between leaders with no authority and those with allocation power while treatments *LP*, *LCC*, *LIC*, and *LCCH* are compared in chapter 2, which investigates the importance of different methods of communication on organisational performance. In chapter 3, we aim to study the impact of followers' happiness and feedback system on leader's behaviour and, hence, the overall outcome (mainly treatments *LAH* and *LCCH*). Finally, in chapter 4, we elicit characteristics and abilities of individuals to generalise traits of an efficient leader (all treatments). We describe in detail the designs of all treatments deployed in this research as the following.

In *LN*, also known as baseline treatment, 18 participants are recruited and firstly required to take characteristics and abilities tests, which are Big 5 (Costa and McCrae, 1992), cognitive reflection test (Frederick, 2005), psychopathy test (Levenson, Kiehl, and Fitzpatrick, 1995) and mathematical test (Gaudeul and Keser, 2017). Next, they are randomly divided into 6 groups, each of which comprises of 3 individuals. Participants are then endowed with initial wealth of 20 ECUs. As the public good game starts, each group member has to decide how much to contribute to the public good. Any amount donated the public good produces a marginal per capital return (MPCR) of 0.5 (Davis and Holt, 1993) while any retained amount earns a return 1 (Ramalingam et al., 2016). This is the reason why public good game is sometimes referred to as investment game (Gaudeul and Keser, 2017). All group members can observe their profits for the current period as well as accumulated profits throughout all periods in the next stage of this treatment. Participants are expected to the play public good game for at least 15

periods, after which the experiment restarts without their being noticed. Experimental instructions for this treatment are provided in *Appendix 10.*

In *LP*, which is conducted in two sessions, there are 14 participants joining in each session. They are also firstly required to take personalities and abilities tests. In the second stage, participants are asked to compose a short paragraph addressing if they want to become a leader and why they should be selected as leader. Next, 5 participants are randomly chosen as potential leaders while other 9 participants are organised into small groups of 3 people. Then, written abstracts of 5 potential leaders are displayed to members of all groups. This helps group members have better understanding about candidates for leading positions as group members need to make salary offers to those candidates in the next stage of this treatment to recruit their preferred leaders. When it comes to making offers, members in each group can re-visit abstracts written by 5 potential leaders and decide how much to offer to each of them. The range of offering amounts spreads from 0% to 10% of periodic final output. It is expected that group members make higher offers to leadership candidates they more prefer and lower ones or nothing for those they less prefer or do not prefer at all. After all salary offers have been made, 5 potential leaders can observe the offered amounts and decide which groups they are going to lead. The selection of group occurs on a first-come first-serve basis. Since there are only 3 groups, 2 leadership candidates are left without groups after this stage. These 2 candidates, however, still have chance to select groups once the experiment restarts after the 15^{th} period. Once all groups are filled with leaders, they proceed to playing public good game. Similar to *LN*, each group member (including the leader) is endowed with 20 ECUs and has to decide how much to contribute to the common pool of funds. It is noticed that leader makes no contribution to the public good and s/he receives nothing from the group's final output, which is calculated by multiplying group's total contribution by the multiplier, in case followers offer no salary to her or him. In the next stage, group members and leader can observe group's final output, their individual profits for the period as well as their accumulated profits throughout periods. At the end of each period, members in each group have chance to rate their happiness with the leader. Especially, at the end of 15^{th} period, group members can also decide whether to remove their group leader. Similar to *LN*, participants have no idea about the restart of the experiment after the 15^{th} period. Experimental instructions for this treatment are provided in *Appendix 10.*

We design passive leadership in *LP* in order to estimate the impact of treatment effect. In specific, we want to see how a leader with no formal power or influence on group members differs from one with allocation authority or communication role in *LA*, *LAH*, *LCC*, *LIC* and *LCCH* in terms of enhancing collective performance as well as the obtaining offered salary. In leadership literature, leaders without formal authority or impact on subordinates are firstly discussed in detail by Heifezt (1994). He argues there are individuals, like Gandhi, leading societies without holding formal offices. Those leaders have their own networks of informal authority in which they are respected, trusted and morally persuasive. To put it another way, their words and actions are influential despite of having no authorisation. In treatment *LP*, passive leadership

candidates can make an impact on followers and, hence, receiving higher offers, if they manage to earn belief, moral persuasion and commitment from group members.

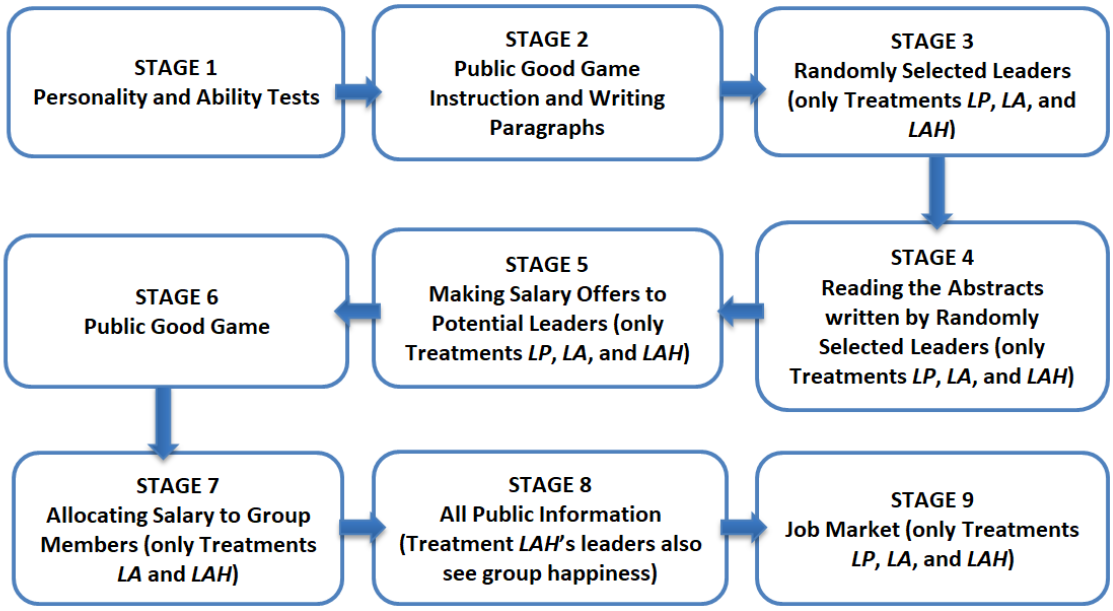


Figure 1: Stages Chart for Treatments *LN*, *LP*, *LA* and *LAH*.

Treatment *LA* also consists of 2 sessions each of which employs 14 participants. The first 6 stages of this treatment are similar to treatment *LP* (*Figure 1*). However, in stage 7, after all group members have made their contributions, group leader can now observe the contribution level of each group member and determine how the group's final output is allocated to those followers. It is important to note that a selected leader only has distribution authority on 70% of the group's final output because each group member is provided with 10% of the group's final output as fixed payments, which are then used to pay salaries for the group leader as committed in the voting stage. Also, any portion of the group's final output that is not distributed to group members goes to leader's account. In stage 8, information about group's outcome, individual profits in the current period as well as profits throughout periods are shown to group members and the leader. Group members are then asked to give their ratings on satisfaction with the leader's recent performance in which 1 equals to lowest satisfaction and 5 equals to highest satisfaction. The experiment returns to pubic good game stage after group members finish evaluating their leader. Especially, at the end of the 15^{th} period, group members of *LA* can also decide if they should keep or change the current leader for another one. In consistent with the two treatments above, participants in this treatment also do not know about the reset of the experiment after 15 periods. Experimental instructions for this treatment are provided in *Appendix 10.*

In *LAH*, we conduct 2 sessions and recruit 14 participants for each session. Again, the first 6 stages of *LAH* are similar to *LP* while stage 7 and stage 8 bear

resemblances to *LA*. The periodic payoff for each group leader in treatments *LA* and *LAH* are calculated using the following formula:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3} + (p - b_{i,1} - b_{i,2} - b_{i,3})$$

where, w_{Li}: the earnings (in percentage of final output) for leader *i.*

$L_{i,j}$: the salary offer (in percentage of final output) made to leader *i* by member *j*. Noted that $L_{i,j}$ lies within [0,α], where $\boldsymbol{\alpha}$ is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

p: group's remaining output (in percentage) after paying $\boldsymbol{\alpha}$.

$b_{i,j}$*:* allocation amount (in percentage of final output) to member *j* of group led by leader *i.*

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

while the periodic payoff for each group member is calculated as below:

$$w_j = a - L_{i,j} + b_j$$

where, w_j: the earnings (in percentage of final output) for group member *j* (*j*=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary for leader *i* (*i*=1, 2, 3, 4, 5) by group member *j* (*j*=1, 2, 3).

b_j*:* allocated amount (in percentage of final output) for group member *j* (*j = 1, 2,* 3) determined by the leader.

However, unlike *LA*, the leader in *LAH* can observe the satisfaction of followers with group leaders by the end of each period. In period 15, group members in *LAH* can also keep or exclude their leader. The experiment restarts once the 15th period ends, which is similar to all treatments above. Experimental instructions for this treatment are provided in *Appendix 10.*

Based on our experimental design and treatments that are deployed in the first chapter, we justify and present research hypotheses for this study as the following. The first hypothesis investigates the difference in performance between groups with leaders and groups without leaders. As documented by Rivas and Sutter (2011) and Dannenberg (2014), groups with leaders outperform groups without leaders in terms of total contribution to the public good.

Hypothesis 1: *Groups without leaders and groups with passive leaders should have similar performances or insignificant difference in their performances.*

Our second hypothesis looks into the influence of individual traits on group members' contribution behaviour. According to Kurzban and Houser (2001) , people with high agreeableness make higher contributions on coordination game while

Dannenberg et al. (2015) show that aversion to ambiguity has a negative impact on public good outcome. Additionally, in Lu and Argyle (1991), self-esteem is proved to have correlation with cooperation in domain of decision making. Hence, agents with high level of self-esteem are expected to contribute more to the common good.

Hypothesis 2: *Group members, who are more agreeable, less ambiguity averse, and more self-esteem, make higher contributions.*

The third and fourth hypotheses examine determinants of selected leaders' allocation behaviour. Judge et al. (2002) show neuroticism is negatively correlated with leading capacity while Gächter *et al. (2012) demonstrate Machiavellian leaders exhibit less cooperation. In addition, Drouvelis et al. (2017) find that leaders allocate more collective outputs to high contributors.*

Hypothesis 3: *Neurotic and Machiavellian leaders allocate less output to group members and keep more for themselves.*

Hypothesis 4: *Controlling for contribution level, leaders scoring low on neuroticism and Machiavellianism allocate more final outputs to group members.*

In the fifth and sixth hypothesis, we want to find the nexus between leaders' salaries and performances of groups. Similar to group members, leaders also need motivations, among of which monetary incentive is the most effective one (Dickinson, 2001), to exert more efforts on their duty of elevating collective performances.

Hypothesis 5: *Unsuccessful groups, whose average contribution is lower than the average contribution level of all experimental groups in the first 15 periods, make lower salary offers to potential leaders than over-average-performing groups.*

Hypothesis 6: *Underperforming groups in the first phase increase their salary offers in the second phase to recruit better leaders and, hence, have their outcomes enhanced.*

In the next section, we present the results of our data analysis and discuss them in the light of previous literature with a view to providing a well-founded insight into impacts of leadership with and without allocation authority on the group's outcome.

IV. Data Analysis and Results

1. Difference in performances between groups with leader and groups without leader

Hypothesis 1: *Groups without leaders and groups with passive leaders should have similar performances or insignificant difference in their performances.*

In order to compare the overall performances of groups without leader and groups with passive voted leaders, we apply Mann-Whitney rank-sum test, which is also known as the U-test. We firstly calculate the average contribution of each group for the first phase, second phase and both phases. In total, there are six independent observations in each treatment. The p-value is then calculated and compared with the chosen significance level of 10% or 0.10 to determine if there is a difference in the average performances between groups in two treatments *LN* (baseline, groups with no leaders) and *LP* (groups with voted leader and equally shared final output). It is critical to note that, throughout all chapters, the applied U-test is two-sided and the chosen significance level is 10% or 0.1 unless the otherwise is specified. In the table below, we present, by phases, the average contribution of all groups, which is computed as the average of all groups' contributions, for each treatment and p-value.

As can be seen from the below table, in the first phase, the average contribution of all groups in *LN* is 11.64 ECUs (σ = 3.06) and it is higher than the average contribution of all groups in *LP*, which is 9.74 ECUs (σ = 4.82). However, based on the p-value of the U-test (*p=0.5218*), there is no statistical evidence to conclude that groups without leaders perform better than groups with leaders having no allocation authority. In other words, groups without leaders and groups with passive leaders have indifferent performances.

In the second phase, we observe almost the same pattern of results when the average contribution of all groups in *LN* (μ = 9.17 ECUs) is higher than that of *LP* (μ = 8.28). The p-value of the U-test is also larger than chosen significance level (*p-value = 0.7488*), so we can conclude that groups without leaders and groups with passive leaders have similar performances in the second phase.

Treatments	Observations	Phases		
		Periods 1-15	Periods 16-30	Periods 1-30
Treatment 1 (*LN*) (Baseline)	6	11.63831 (3.060531)	9.174074 (2.45124)	10.40305 (2.160105)
Treatment 2 (*LP*) (Voted leaders and equally shared output)	6	9.736049 (4.822251)	8.281482 (5.547775)	9.008765 (5.108474)
p-value		0.5218	0.7488	0.5218

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 1: Comparison between treatments *LN* and *LP*.

Overall, throughout both phases, the average contribution of all groups in *LN* is 10.403 ECUs and the average contribution of all groups in *LP* is 9.009 ECUs. Since the p-value of the U-test is larger than chosen significance level (*p-value = 0.5218*), we are able to confirm that there is no statistical difference in performances between groups without leaders and groups with passive leaders across both phases.

We also provide graphical illustration of the difference in average contribution between *LN* and *LP* across both phases in the figure below. It is noted that, for each treatment, the average value on contribution in each period is calculated as the average of all six independent groups' contributions in that period. We can see from the figure below that the average contributions of *LN* are higher than those of *LP* in each phase as well as across two phases. In phase 1, there is no end-game effect in *both LN* and *LP*. We conjecture that this phenomenon is due to the fact that participants are not informed about the length of experiments. The end-game effect can be seen clearer in both treatments at the end of the second phase. One of the explanations for this is participants learn from the first phase that the game lasts for 15 periods and, hence, free-ride in last period of phase 2. In addition, we observe that, in period 16, average contributions of groups in *LN* and *LP* are below those in period 1 indicating insignificant restart effect.

We conjecture that in *LN*, group members are more cooperative and donate more ECUs to the public good hoping and assuming higher potential returns from group contributions. On the contrary, group members have less incentive to contribute to the public good in *LP* as they realise that leader does not make any contribution or exert any effort to elevate performance of the group although s/he receives fixed payments in each period.

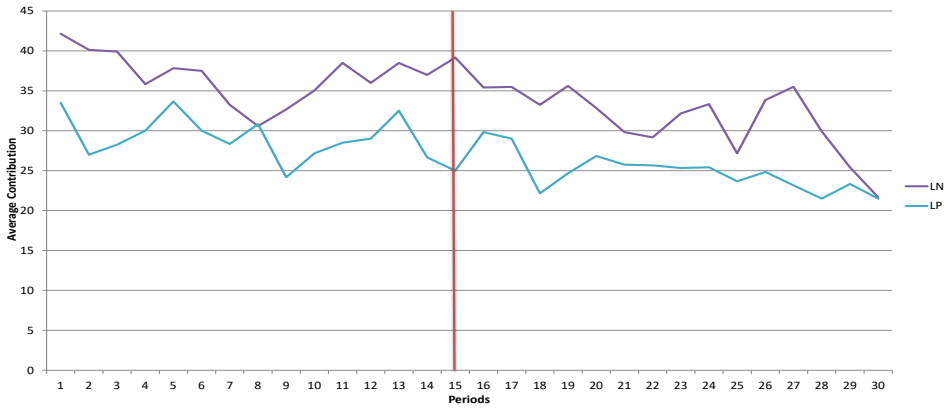


Figure 2: Average Contributions in *LN* and *LP.*

Compared to previous literature, the above results are in line with Pelz (1952), which states that leader without power does not make much difference to subordinates' behaviour and, hence, their exerting efforts to work. Besides, Tannenbaum (1962) highlights that powerless leaders can almost do nothing on the behalf of their teams and are useless for confronting problems challenging her group. In addition, as leaders in *LP* do not make contributions or exert any effort to improve groups' performances, they are more or less free riders in their own groups. As a consequence, group members are discouraged from donating their wealth to the common pools of funding. Such phenomenon has been tremendously recorded in a number of researches on public good game where the existence of free-rider deteriorates collective outcomes (Fehr and Schmidt, 1999; Fischbacher and Gächter, 2010).

Result 1: *There is no difference in collective performances between groups without leaders and groups with passive leaders.*

2. Group members' personalities and contribution levels

Hypothesis 2: *Group members, who are more agreeable, less ambiguity averse, and more self-esteem, make higher contributions.*

Contribution to public good game can be determined by a variety of factors in which players' characteristics are one of them. In this hypothesis, we want to study how personality traits of individuals affect their contributions and whether these characteristics alter over time. We firstly compute the average contribution of each individual in the first phase, the second phase and throughout both phases. Then, we regress these calculated values on characteristics of each individual that we elicit in the first stage of our experiments such as agreeableness, extraversion, ambiguity-seeking and self-esteem. These characteristics have been widely examined in relation to cooperation in pre-existing studies. Results from this regression can provide a deeper

understanding on key traits explaining collaborative behaviour in organisational structure as well as helping reduce free-riding problem.

The table below shows our findings on the relationship between group members' characteristics and their contribution behaviours. We employ pooled OLS regression with robust standard error clustered on groups to regress individual average contributions on personality traits and data of all four treatments *LN, LP, LA and LAH* are used as we want to explore what traits are the most common drivers of followers' contribution behaviour regardless of leaders' roles in these treatments. Regression results are presented for the first 15 periods (phase 1), the second 15 periods (phase 2), and the whole 30 periods (both phases).

Variables	**Phases**		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Agreeableness	2.633165**	4.097928***	3.365547***
	(1.17407)	(1.166809)	(1.088071)
Extraversion	-1.642303	-1.409626	-1.525965
	(1.067474)	(1.273172)	(1.088236)
Ambiguity Seeking	1.061607**	1.429989**	1.245798***
	(.3901119)	(.5218961)	(.3930443)
Self-esteem	.876069*	1.177987*	1.027028*
	(.4812473)	(.6751987)	(.5078469)
Constant	-.2802618	-8.19455	-4.237406
	(5.042532)	(5.355351)	(4.709494)
Observations	72	72	144
R-squared	0.1879	0.2631	0.2234

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, robust standard errors (clustered on groups) in parentheses.

Table 2: Pooled OLS regression predicting individual average contribution.

It is consistently found that group members' contributions are positively correlated with agreeableness, ambiguity aversion and self-esteem in the first 15 periods, the second 15 periods and throughout 30 periods. In addition, an F-test conducted on coefficients of regression model for all periods (both phases) confirms that they are jointly different from zero at 10% significance level ($F(4, 23) = 8.61$, $p < 0.001$). From this onwards, unless the otherwise is specified, the chosen significance level for F-test is 10% or 0.1.

People with high agreeableness are recorded to have individual preferences for cooperation and, hence, make higher contributions in coordination games (Volk et al.,2011; Kurzban and Houser, 2001). Ambiguity aversion implies the degree one is averse to uncertainty and has been demonstrated to have an adverse impact on public good game outcome (Dannenberg et al, 2015). Gangadharan and Nemes (2009) also state that attitude of avoiding uncertainty leads to significant drop in contributions to

the common good and cooperation can rebound once uncertainty is decreased**.** To put it another way, people with less ambiguity aversion are expected to donate more and this is in line with our finding regarding ambiguity seeking.

From the table above, self-esteem is discovered to have positive nexus with individual average contribution to the public good. This implies high self-esteem individuals tend to cooperate well with each other, which is in line with Kurzban and House (2001). In Lu and Argyle (1991), self-esteem is measured by Rosenberg's self-evaluating scale (1965) and is also proved to have correlation with cooperation in domain of decision making.

Overall, we find that group members that are more agreeable, ambiguity-seeking and self-esteem contribute more to the public good. Our findings are thorough and significant across all experimental phases.

Result 2: *Group members, who score high on agreeableness, ambiguity-seeking and self-esteem, contribute more to the public good. Especially, agreeableness is the strongest personality trait that drives the contribution levels of individuals.*

3. Leader's characteristics and allocation behaviour

Hypothesis 3: *Neurotic and Machiavellian leaders allocate less output to group members and keep more for themselves.*

We deploy average allocation of output by leader in each phase and average allocation of output by leader throughout both phases (in absolute values) to run regressions on leaders' personality and ability traits, which are elicited during the experiments. In specific, we select neuroticism and Machiavellianism as explanatory variables as there have been plenty of papers conducted on the significances of these two characteristics on leadership behaviour. Regression results are displayed in the table below and reported by experimental phases. The number of observations is 12 for each phase and 24 for both phases. Data employed in this hypothesis comes from treatments *LA* and *LAH*.

Variables	Phases		
	Periods 1-15	Periods 16-30	Periods 1-30
Neuroticism	-5.826321*	-9.982255*	-8.348493***
	(3.05382)	(4.800399)	(2.899421)
Machiavellianism	-8.968857 **	6.310829	-4.844173
	(3.737277)	(9.136383)	(4.206007)
Constant	54.01849***	25.51475	50.27354***
	(14.26109)	(30.51864)	(15.08589)
Observations	12	12	24
Adjusted R-squared	0.3483	0.2694	0.2220

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 3: Pooled OLS regression predicting leader's average allocation of output.

Neuroticism is consistently recorded to have negative impact on leaders' allocation behaviour in each phase and across both phases while Machiavellianism is found to have adverse influence on leaders' allocation habit in the first phase only. An F-test is also performed on the coefficients of two-phase regression model to test if they are all equal to zero. Since F-statistic equals to 4.28 and p-value is 0.0276, we can conclude that coefficients on neuroticism and Machiavellianism are jointly different from zero.

There is a vast literature in psychology and experimental economics studying the negative relationship between neuroticism and leadership as well as the adverse tendency of neurotics in cooperation. Judge, Bono, Ilies and Gerhardt (2002) find that neuroticism has negative relationship with leadership, which is in line with Judge and Bono (2000). In addition, Lonnqvist, Verkasalo and Walkowitz (2011) highlight that high neuroticism predicts less cooperation.

Similar to neuroticism, Machiavellianism has also been examined in the fields of psychology, management and experimental economics. A majority of articles agree that individuals with high Machiavellianism exhibit mistrust in other people, lack of morality, and insufficient interpersonal connections (Christie and Geis, 1970; Drory and Gluskinos, 1980). Machiavellians are reported to make lower offers in dictator games (Carpenter Burks, Verhoogen, 2005). Additionally, Gächter, Nosenzo, Renner and Sefton (2012) demonstrate that leaders with high score on Machiavellianism tend to contribute less to the public good. In the current chapter, we find that leaders with high Machiavellianism allocate less to group members, which is line with previous researches. Nonetheless, this result is not thorough and only significant in the first phase.

The reason why Machiavellianism is no longer significant in the second phase of the experiments is because there are changes in the allocation behaviour of group leaders, especially re-selected ones. In the figure below, we present the changes in group leaders from phase 1 to phase 2 and the relevant retention ratios, which are computed by dividing the allocation amount the leader keeps for herself by the group's final output.

		Phase 1				Phase 2		
	Groups	Machiavellianism score	Average Final Output (in ECUs)	Retained by Leader (% of Average Final Output)	Leader change (Yes/No)	Machiavellianism score	Average Final Output (in ECUs)	Retained by Leader (as % of Average Final Output)
Treatment LA	1	2.2	33.8	29.01%	Yes	2.35	22.87	61.27%
	2	2.85	30.2	34.72%	Yes	2.2	23.33	39.76%
	3	2.4	26.42	53.20%	No	2.4	16.28	49.55%
	4	2.75	12.31	49.91%	No	2.75	10.98	48.27%
	5	3.35	18.48	60.72%	Yes	2.75	15.32	68.04%
	6	2.65	38.07	28.67%	No	2.65	42.13	26.11%
Treatment LAH	1	1.9	32.2	35.22%	Yes	2.75	36.9	51.82%
	2	2.65	29.27	21.91%	No	2.65	34.8	14.47%
	3	3.1	22.87	64.06%	No	3.1	44.93	36.53%
	4	2.8	27.98	33.46%	No	2.8	34.33	28.44%
	5	2.6	28.8	15.83%	No	2.6	46.2	21.60%
	6	2.85	28.67	34.36%	No	2.85	36.93	26.59%

Figure 3: Changes in group leaders from phase 1 to phase 2 of treatments *LA* and *LAH.*

As can be seen from *Figure 3*, most of the groups in treatments *LA* and *LAH* have the same leaders throughout both phases while there are only four groups having their leaders changed after the first phase. In groups where leaders are unchanged across phases, as they proceed from phase 1 to phase 2, leaders change their retention behaviour significantly by allocating more to group members and keep less output for themselves regardless of their Machiavellianism levels. In other words, first phase's leaders, after being re-selected in the second phase, act more efficiently in order to promote the contribution of group members to the public good. Using Wilcoxon signed-rank test (*Table 4*), we manage to show that there is a significant difference in retention ratios of re-selected leaders between the first and the second phase. Throughout all chapters, the applied Wilcoxon signed-rank test is two-sided and selected significance level is 10% or 0.1 unless the otherwise is specified.

	Observations	Mean
Average retention ratio in phase 1 of re-selected leaders	8	37.63% (16.5%)
Average retention ratio in phase 2 of re-selected leaders	8	31.5% (12.56%)
p-value		0.0687*

Notes: p-value is based on Wilcoxon signed-rank test, ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 4: Comparison of phase 1 and phase 2's retentions ratios of re-selected leaders.

As a result, Machiavellianism, in the second phase, does not statistically drive the allocation behaviour of group leaders as strongly as they did in the first phase and, hence, becomes insignificant.

Also, in groups where leaders are changed in the second phase, two groups recruit new leaders with higher Machiavellianism as compared to those in the first phase (Group 1 of *LA* and Group 1 of *LAH*) and two groups recruit new leaders with lower Machiavellianism as compared to those in the first phase (Groups 2 and 5 of *LA*). All of those new leaders are found to keep more collective output for themselves ($\mu_{retention,\ phase\ 2,\ LA,\ group\ 1}$ = 61.217%, $\mu_{retention,\ phase\ 2,\ LA,\ group\ 2}$ = 39.76%, $\mu_{retention,\ phase\ 2,\ LA,\ group\ 5}$ = 68.04% and $\mu_{retention,\ phase\ 2,\ LAH,\ group\ 1}$ = 51.82%, respectively) than those in phase 1 ($\mu_{retention,\ phase\ 1,\ LA,\ group\ 1}$ = 29.01%, $\mu_{retention,\ phase\ 1,\ LA,\ group\ 2}$ = 34.72%, $\mu_{retention,\ phase\ 1,\ LA,\ group\ 5}$ = 60.72% and $\mu_{retention,\ phase\ 1,\ LAH,\ group\ 1}$ = 35.22%, respectively). This contradicts to what is found in phase 1 about the relationship between Machiavellianism and allocation behaviour as only higher Machiavellian leaders are predicted to allocate less output to team members in the first phase. Therefore, this more or less decreases the statistical influence of Machiavellianism on allocation behaviour of leaders in the second phase.

Result 3*: Leaders, who score high on neuroticism, allocate less output to group members. The influence of Machiavellianism on the allocation behaviour of group leaders is only significant in the first phase.*

4. Group members' contributions and leader's allocation of final output

Hypothesis 4: *Controlling for contribution level, leaders scoring low on neuroticism and Machiavellianism allocate more final outputs to group members.*

This hypothesis is a continuation of hypothesis 3. We have seen how neuroticism drives the allocation behaviour of leaders in previous hypothesis, but there is still one more variable that influences the movement of average allocation by leader and it is groups' average contributions level. It is important to note that, before making

allocation decisions, leaders have chance to observe contribution levels of followers and, therefore, this source of information is expected to have certain impact of leaders' decisions to distribute output accordingly. In this hypothesis, we employ the model in hypothesis 3 and control for the effect of groups' average contributions. We expect to see how the inclusion of contribution level in the model affects statistical significance of neuroticism and Machiavellianism. Besides, we also want to examine if the effect of contribution level on allocation behaviour of group leader differs between treatments. In order to do this, we create a dummy variable that takes the values of 0 for *LA* and 1 for *LAH.* Data on leaders' average allocations of *LA* and *LAH* is used to regress on leaders' neuroticism, Machiavellianism, average contributions at group level and treatment dummy variable. For comparison purposes between experimental phases, we present regression results by phase and for both phases.

Variables	**Phases**		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Neuroticism	-2.591973	-.4733138	-1.527916
	(2.57807)	(3.370199)	(1.745454)
Machiavellianism	-2.185658	-2.490565	-2.014746
	(3.104635)	(6.082162)	(2.139305)
Contribution	.6530194***	.623635***	.6281034***
	(.1741657)	(.166366)	(.0814873)
Treatment _ Dummy	-1.221094	.4674148	-.4451595
	(2.021586)	(3.807469)	(1.54412)
Constant	9.81748	4.116968	6.391211
	(17.19987)	(19.5062)	(9.249982)
Observations	12	12	24
Adjusted R-squared	0.7415	0.7715	0.8082

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 5: Pooled OLS regression predicting leader's allocation of output to group members.

As can be seen from the regression table above, controlling for group's average contribution and treatment dummy variable, both neuroticism and Machiavellianism have no statistical effects on leaders' allocation behaviour. This implies that contribution level is a better predictor for leaders' allocation behaviour as it manages to explain a unique variation in the amounts of collective output leaders allocate to their group members that cannot be captured by other variables. However, the significant influence of contribution level on group leaders' allocation is indifferent between *LA* and *LAH*. An F-test is also conducted on the regression model for both phases (periods 1-30) to test if the model's coefficients are jointly different from zero. Since F-statistic is 25.23 and p-value is a lot smaller than 0.0001, we conclude that there is statistical evidence that regression coefficients on neuroticism,

Machiavellianism, groups' average contribution and treatment dummy variable are jointly different from zero and, hence the model should have strong predictive power.

In this hypothesis, allocation can be seen as rewards to group members, especially for high contributors. For low contributors, allocation from group leader provides a good incentive for them to increase their contributions over periods. Our result is supported by Heijden et al. (2009), Drouvelis, Sefton, and Nosenzo (2017), and Abeler, Altmann, Kube, and Wibral (2010). In these studies, the authors also highlight the importance of leaders with allocation authority and how powerful leaders reduce free-riding problem in public good game.

In addition, Rivas and Sutter (2011) show that there is a positive influence of rewarding on group's contribution level. They find that reward mechanism always increases the cooperation between group members no matter whether a leader is installed into the group or not. Furthermore, Fehr and Gächter (2000) relates to our study in the sense that if leaders keep all outputs for themselves, followers retaliate later on by not contributing anything.

Result 4: *Controlling for groups' contribution level, neuroticism and Machiavellianism have no significant effect on allocation behaviour of leaders.*

5. Group's performance and group members' salary offers

Hypothesis 5: *Unsuccessful groups, whose average contribution is lower than the average contribution level of all experimental groups in the first 15 periods, make lower salary offers to potential leaders than over-average-performing groups.*

We firstly identify better-than-average performances and lower-than-average performances groups by comparing their average contributions of the first 15 periods with the average contribution of all groups in the first 15 periods. For groups that have higher-than-average performances, we label them as 1. For groups that have lower-than-average performances, we, hence, label them as 0. Next, we need to compare the average contributions of high-performance groups (in ECUs) with those of low-performance groups using Mann-Whitney test. Then, we do the same for average salary offers (as % of group's final output) of all members in high-performance groups in period 1 (start of first phase) with those of low-performance groups in period 1 by using Mann-Whitney test. We also perform descriptive statistics to have a better understanding of the difference between these two group categories. Data employed for this hypothesis is from treatments *LP*, *LA*, and *LAH*.

	Observations	Mean
Average contributions of high-performance groups (in phase 1)	9	11.71545 (2.438159)
Average contributions of low-performance groups (in phase 1)	9	6.786303 (2.086072)
p-value		0.0003***

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 6: Comparison of average contributions (in ECUs) of high and low performance groups in the first 15 periods.

As can be seen from *Table 6*, the average contribution of high-performance groups (also called efficient groups) is 11.72 and the average contribution of low-performance groups (also called inefficient groups) is 6.79. In addition, the p-value (*p = 0.0003*) of the U test is smaller than chosen significance level, so we can conclude that average contributions of efficient groups are statistically larger than those of inefficient groups in the first 15 periods. In the next table (*Table 7*), we present statistics of average salary offers to leaders by efficient groups and by inefficient groups in the first experimental phase. Also, we provide result of the U-test on the difference between efficient and inefficient groups in terms of their average offers to potential leaders in the voting stage.

	Observations	Mean
Average salary offers of high-performance groups (in phase 1)	9	5.020906 (1.561221)
Average salary offers of low-performance groups (in phase 1)	9	3.274647 (1.755808)
p-value		0.038**

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 7: Comparison of average salary offers (as % of group's final output) of high and low-performance groups in the first 15 periods.

It can be seen that high-performance groups make higher offers to potential leaders than low-performance groups. While the average salary offer by high-performance groups is 5.02% of final output, the average salary offer by low-performance-groups is 3.27% of collective output. The p-value (*p=0.038*) of the U test is

smaller than chosen significance level, so we are able to conclude that inefficient groups in the first 15 periods make statistical lower offers to potential leaders than efficient groups in the voting stage. Our hypothesis is, therefore, reinforced.

Higher salary offers provide leaders more incentives to exert effort on leading groups and uniting group members to achieve the best outcomes. In addition, high salaries can also reduce bureaucratic conflict between leaders and group members and align their interests with each other. Literature in sociology, psychology and economic development has documented the movement between raising salary and decreased bureaucratic issues such as conflict and corruption. Van Veldhuizen (2013) and Armantier and Boly (2011) show that bureaucratic corruption can be reduced by increasing salary level in laboratory and filed experiments. Rijckeghem and Weder (2001) find that the higher salary level a country has the less corruption it suffers.

Bar charts of average salary offers and average contributions of two group categories in the first phase are presented in the *Appendix 1.*

Results 5: *Underperforming groups in the first phase make lower salary offers to selected leaders.*

6. Change in groups' salary offers to potential leaders for the sake of improving collective efficiencies

Hypothesis 6: *Underperforming groups in the first phase increase their salary offers in the second phase to recruit better leaders and, hence, have their outcomes enhanced.*

Based on *Hypothesis 5*, we are to determine which groups are efficient and which groups are inefficient in the first 15 periods. In this current hypothesis, we want to conduct further investigation to see if inefficient groups increase their offers to leaders at the start of second phase (period 16) so as to recruit better leaders for their groups. We continue to label phase 1's inefficient groups as 0 in the second phase and phase 1's efficient groups as 1 in the second phase. Next, we compare the average salary offers (as % of group's final output) of these two group categories using Mann-Whitney test. We then perform the same test on the average salary offers of low performance groups in both phases to see if they are differences and if inefficient groups in the second do increase their salary offers. Our findings are presented in the following tables:

	Observations	Mean
Average salary offers of phase 1's high-performance groups in phase 2	9	5.558882 (2.110644)
Average salary offers of phase 1's low-performance groups in phase 2	9	3.592553 (1.83933)
p-value		0.038**

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 8: Comparison of average salary offers of phase 1's efficient and inefficient groups in the second phase.

	Observations	Mean
Average salary offers of low-performance groups in phase 1	9	3.274647 (1.755808)
Average salary offers of low-performance groups in phase 2	9	3.592553 (1.83933)
p-value		0.4413

Notes: p-value is based on Wilcoxon signed-rank test, ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 9: Comparison of average salary offers (as % of group's final output) of inefficient groups in the first 15 periods and inefficient groups in the second 15 periods.

As can be seen from *Table* 8, phase 1's inefficient groups continue to offering lower salaries to potential leaders in the voting stage (*p=0.038*). While the average salary offer of phase 1's efficient groups in the second phase is approximately 5.56, the mean offer of all phase 1's inefficient groups in the second phase is closed to 3.60. *Table 9* provides the comparison between average offers of inefficient groups in two different phases using Wilcoxon signed-rank test. Based on the test's p-value (*p=0.4413*), we are able to conclude that there is no statistical evidence to reject the null hypothesis that the average salary offers of inefficient groups in the second phase is different from those of inefficient groups in the second phase.

Also, we want examine how phase 1's inefficient and efficient groups perform in the second phase. We, therefore, conduct the U-test on the average contributions (in ECUs) of inefficient and efficient groups in the second phase. The results are presented below:

	Observations	Mean
Average contributions of phase 1's high-performance groups in phase 2	9	12.20111 (2.994199)
Average contributions of phase 1's low-performance groups in phase 2	9	6.636449 (4.03675)
p-value		0.0054***

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 10: Comparison of average contributions (in ECUs) of phase 1's efficient and inefficient groups in the second 15 periods.

Similar to hypothesis 5, inefficient groups, whose average salary offers to potential leaders are lower, underperform efficient groups, whose average salary offers to potential leaders are higher (*Table 10*). While phase 1's efficient groups contribute about 12.20 ECUs on average in the second phase (with lower standard deviation of almost 3.00), phase 1's inefficient groups donate approximately 6.64 ECUs to the public good in the second phase (with higher standard deviation of nearly 4.04). The average performance of inefficient groups in the second phase is even worse than in the first phase while that of efficient groups increase.

Bar charts of average salary offers and average contributions of two group categories in the second phase are presented in the *Appendix 6*.

Result 6: *Poor-performance groups in the first phase do not statistically increase their salary offers in the second phase to recruit better leaders, who can help those groups increase their performances.*

V. Summary and Conclusion

This chapter mainly focuses on the importance of leaders with allocation authority to group members' contribution behaviour and, hence, the efficiency of collective performance. Besides, we analyse the difference between groups with leaders and groups without leaders in terms of total contribution to the public good. How characteristics of leaders influence their allocation behaviour is also a significant aspect that we look into in this study. In addition, we identify key personality traits that drive the contribution behaviour of group members. Last but not least, we examine if group members alter their salary offers with a view to recruiting better leaders for their groups in case their groups underperform in the past experimental phase. As discussed in the literature, a number of researches have demonstrated the importance of leaders to elevating performances in public good game context. Leaders can either be selected exogenously or endogenously both of which are recorded to increase group's

performances as compared to groups without leaders. However, exogenous leaders or randomly selected leaders are criticised for being non-democratic (Hamman et al., 2011; Brandts et al., 2015) while voted leaders are said to gain legitimacy and, hence, have more influence on followers. We, in this chapter, propose a leader selection method in which group members manage to obtain information about potential leaders' traits and abilities through the abstracts these leaders are required to compose in advance. It is noticeable that the composition of introductory abstracts bears resemblances to applying resumes for job vacancies. After reading leadership candidates' written paragraphs, group members can make salary offers to them. The offers not only reveal group members' preferences over each candidate but also provide incentives for candidates to exert more effort on leading groups later on. After 15 periods, there is a game restart, which is not informed to participants beforehand, and they are able to choose leaders for their groups again. If group members experience bad outcomes in the first experimental phase, they can offer higher salaries to recruit more effective leaders.

Our results are presented as the following. In treatments *LN* and *LP*, we find no statistical difference between groups without leaders and groups with passive leaders, who are voted but have no allocation authority during the experiments. The result is consistent throughout two experimental phases. In treatments *LP*, *LA* and *LAH*, we find that individuals, who are more agreeable, ambiguity-seeking and self-esteem, contribute more to the public good. These results are significant in the first and the second phase as well as across both phases. Our third finding is that, in treatments *LA* and *LAH*, leaders allocate more output to group members making higher contributions to the public good in both phases regardless of leaders' neuroticism and Machiavellianism. Next, we demonstrate that leaders with neuroticism and Machiavellianism allocate less to followers. While neuroticism is proved to consistently reduce allocation of leaders to group members, Machiavellianism's effect is less thorough and significant in the first 15 periods only. The remaining two findings are related to each other. In treatments *LP*, *LA* and *LAH*, we find statistical difference in average salary offers to potential leaders in the voting stage between efficient groups, which are defined as groups with average contributions throughout the first 15 periods that are higher than the average contributions of all groups in the first 15 periods, and inefficient groups, which are defined as groups with average contributions throughout the first 15 periods that are lower than the average contributions of all groups in the first 15 periods. Also, in treatments *LP*, *LA*, and *LAH*, we explore that there is no statistical difference between the average salary offers to potential leaders from inefficient groups in phase 2 and those from inefficient groups in phase 1. In addition, performances of inefficient groups are statistical lower than performances of efficient groups throughout 30 periods.

To conclude our research, we want to provide some implications, first of all, for administration. One of our findings suggests that leadership with no authority has no effect on increasing efficiency of the organisation. First-line supervisors, who play the role of the middle men between upper management levels and subordinates, are found to be less efficient through years due to their eroded power or influence on

followers (Kerr, Hill and Broedling, 1986). The reasons given are that first-line managers are not adequately empowered; they have lack of involvement in company's decision-making process; and the changing nature of organisations increases the distance between first-line managers and upper management. As a consequence, first-line managers find their positions downplayed. In order to reverse the situation, organisations should provide first-line managers more levers of authorities (Orpen, 1994) so that they can have larger influence on subordinates and be more confident in leading their teams. These authorities include the right to hire and fire employees, evaluation of employees' performances and deciding bonuses or salary promotions based these performances. In relation to our study, leaders in treatments *LA* and *LAH* are empowered with allocation authority and it is proved that group members' contributions to the common good positively correlate with the allocation amounts from leaders. Also, first-line managers should receive more skills training to have proficiency in technology and human relations. With the fast-changing pace of modern societies, first-line managers are supposed to be technically knowledgeable if they want to increase their influences and obtain credibility from subordinates (Orpen, 1994; Kerr, Hill and Broedling, 1986). Besides, first-line managers need to be good at communicating with their subordinates, transmitting information up and down the hierarchy efficiently as well as understanding their employees (Kerr, Hill and Broedling, 1986; Tannenbaum, 1962).

Second of all, our research is useful for human resource management in the sense that we have constructed a set of personality traits as well as characteristics of effective organisational members and leaders. Scientists in human resource management and psychology have attempted to correlate individual's personality traits with job performances for almost a century (Rothmann and Coetzer, 2003; Barrick, Mount and Judge, 2001). There is a diverse range of traits having been found to explain the variations in job outcomes, but no consensus has been reached on this at this stage. Our findings in hypothesis 2 provide a solid guideline for human resource managers on how to screen proper candidates for job vacancies in companies or organisations. Our experimental methods of eliciting individuals' characteristics can also be applied in recruitment process.

Characteristics of effective leadership have been increasingly concentrated since 1980s (Weinberger, 2009, Yukl, 1998). Big 5 is recorded to be the most popular test for studying traits of leadership (Judge et al., 2002; De Hoogh, Hartog and Koopman, 2005). As aforementioned, the test measures five different dimensions of individuals' personalities, which are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Besides, Machiavellianism test is also widely employed to study leadership as Machiavellianism is one of the traits in the dark triads (narcissism, psychopathy, and Machiavellianism). In our study, we employ both of these tests besides other tests to produce generic pictures about each participant and we underscore the inverse relationship between neuroticism and Machiavellianism and effective leadership. The results are not surprising as they are in line with most of previous studies on leadership traits and can represent the behaviours of neurotic and Machiavellian leaders in veridical organisations.

Thirdly, self-regulated or autonomous organisations have been proposed in a number of studies as a solution to leadership crises (Kerr, Hill and Broedling, 1986; Ostrom et al., 1992). For many years, scientists have still not reached a final consensus on the importance of leadership in organisational contexts. Some of them, therefore, question if leaders are truly necessary or institutional communication and enforcement can autonomously solve collective problems. Hamman et al. (2011), however, has another point of view and state that it is worth learning how democratic institution functions in reality and affects donation in public good game. In our study, group members are given the opportunities to elect leaders through a salary offer mechanism. Moreover, each group member, before going to the poll, is provided with abstracts written by leadership candidates. These pieces of writing supply basic understanding about each candidate and help group members avoid selecting free-riding or dictatorial leaders. Our experimental design simulates recruiting process in real world, which consists of identification, attraction, and selection (Craig, 2015), and add more tactics to human resource management's recruitment of top-tier performers.

Our study's results are generated from a specific context in which leadership with allocation power and group members' cooperativeness are central. Future researches can elaborate more on our design to produce deeper insight into leader-members relationship and mutual benefits. In addition, we encourage researchers to find other managerial tools to set leaders' impact on followers' behaviours such as communication (Brandts et al., 2015), ostracism (Güth et al., 2004), sanction (Fehr and Gächter , 2000) and so on. Last but not least, since the only information about potential leaders is the written abstracts while we obtain a variety of individuals' characteristics and abilities data, we expect to see future studies to provide further details or a different type of information about potential leaders to examine if these change the leader choices as well as the levels of salary offers.

Chapter 2: Communicating leaders and efficiency of their communication methods on subordinates' behaviour

I. Introduction

Leadership has been proved to be a pre-eminent factor of organisational success in a number of studies in management, psychology and economics (Drouvelis et al., 2017, Bass and Bass, 2008; Hermalin 2013). Nevertheless, there are articles casting doubts on attribution of it to corporate profitability and development. Pfeffer (1977) find the evidence that leadership is a sense-making process that aims at attributing collective good outcomes to actions of leaders. Staw (1975) and Calder (1977) similarly suggest that leadership is possibly investigated on attributional perspective rather than actual causality of events and occurrences. Day and Lord (1988) assert that conflicting view on role of leadership has halted developments of theories and practices.

Meindl, Ehrlich and Dukerich (1985) are among the first to attempt to explain contrasting opinions on leaders and their importance on organisational settings. Firstly, they contend that researchers' employing different assumptions on the influence of leaders on collective outcomes is one source of disputes over leadership. Secondly, scientists are recorded to use different theories as well as methodologies to discover separate angles of leaders' abilities. In addition, some studies even have inappropriate focuses when learning about power holders. Thirdly, observers of leadership in organisations understand and interpret leaders' roles heterogeneously and, hence, improperly attribute communal outcomes to leaders' actions. In the current study, we want to resolve long-lasting arguments between scientists on whether leaders have an impact and how they help improve coordination problems in social constructs.

The concept of leadership has been confused with management over decades. Smith and Peterson (1988), Badaracco and Ellsworth (1989), and Cohen (1990) try to equalise leaders to good managers. Jacobs (1970) and Zaleznik (1977) are among the first authors, who draw a line between leadership and management. Later, we have Hickman (1998), Weathersby (1999) and Daft (2008). In particular, Daft (2008) has provided five dimensions for differing between management and leadership. They are direction, alignment, relationship, personal qualities and outcomes. In terms of direction, while managers focus on planning schedules and distributing resources to implement those schedules, leaders create visions and develop appropriate strategies for followers to accomplish them. In regards to alignment, leaders are said to convey visions to followers through communication and build up shared cultures and values within organisations whereas managers concentrate on directing staffs into specialties and functions as well as control their task execution. In relationship with subordinates, managers rely on hierarchical power to push people towards goals and give orders. Leaders, on the other hand, prefer motivating and inspiring followers to bring out their best and look at the same direction to achieve common goals. In short, management is a relationship where formal position power reigns while leadership is built on personal

influences but without coercion. The fourth difference between leadership and management is personal qualities. According to Daft (2008), managers are endowed with great expertise, having deep insights into organisations and require conformity from others. Leaders, however, do not attempt to force everyone to think the same way as they do. Instead, leaders are willing to listen to their subordinates and think outside the box. Besides, a good leader also shows his or her care for followers and appreciates emotional connection with them (Daft, 2008). Finally, outcomes are the last dimension that distinguishes leadership from management. For managers, achieving short-terms goals and satisfying stakeholders, especially shareholders, are the utmost priority. They also aim to maintain the efficient and stable status quos of firms. Leaders, in contrast, have longer-hauled objectives such as making radical changes to firms so that they can deal with new challenges in the future and to gain new market shares (Daft, 2008). A summary of differences between managers and leaders are also provided in *Appendix 2.*

In behavioural sciences, leadership emerges as a solution to social dilemma. De Cremer (2000) highlights that people tend to rely on leaders, especially, when they are in failure. It is efficiency of leaders in managing common goods and resources that underscores their vitality. Yamagishi (1986) provides three main reasons why people require a leader. The first to be mentioned is that group members are aiming to accomplish and sustain mutual collaboration. The second reason is members of group are aware that such cooperation can never be achieved without a leader. And, the third reason is hierarchical structure, like leader-members relationship, turns out to be effective in pursuing mutual benefits.

In experimental economics, leadership is a vibrant flow of research and has received significant attention from academics. A large number of papers have managed to highlight the importance of leadership to success of organisations (Wilson and Rhodes, 1997; Moxnes and Heijden, 2003; Heijden et al., 2009; Rivas and Sutter, 2011). In addition, they also demonstrate a behavioural shift to a more cooperative and sustainable direction thanks to the introduction of leaders to organisational structures such as groups or teams (Brandts, Rott and Sola, 2016)) or firms and banks (McDougall, Covin and Dalton, 2002). Nosenzo and Sefton (2014) assert that an administrative system with delegated monitors or leaders is necessary for managing incentive resources, which can be disbursed to motivate individuals to act cooperatively in coordination games. Gächter and Renner (2018) content that leaders serve as a role model for followers and are able to shape their beliefs in a variety of contexts where one's action rest on others' actions.

There are different mechanisms a leader can employ to improve cooperation in public good game. One of them is applying punishment to free-riders at some personal expenses. This method is firstly examined by Yamagishi (1986, 1988). Later papers that also investigate punishing method include Ostrom et al. (1992), Fehr and Gächter (2000), all of which agree on the effectiveness of punishment on collective outcome. Furthermore, Ramalingam et al. (2016) investigate if the cost to participate in the punishment stage influences group members' sanctioning behaviour and, thus, collective performances. It is surprisingly found that when the decision to join in the

punishment stage is costly, individuals choose to punish more frequently than when the decision to do so is costless or exogenously assigned. Also, people, who choose to pay for punishing other individuals, are reported to punish high and low contributors with almost the same density. This phenomenon is known as blind revenge and previously documented by Ostrom et al. (1992). Furthermore, average contribution of individuals, who pay to participate in the punishment stage, is lower than that of those paying nothing to punish other players in the same group. This, in turn, results in lower earnings for experimental subjects in the treatment where entrance to punishment stage is costly. The second method to be mentioned is ostracising uncooperative individuals from conditional co-operators with a view to maintaining high contribution level over time (Oprea et al. 2014). The third mechanism for enhancing collective effort is allowing communication between group members. According to Oprea et al. (2014), communication distinguish itself from the other two mechanism in the sense that it does not require any institutional intervention or lead to inefficiencies as punishment does.

In the current chapter, we want to draw our attention to communication since it is suggested as one of the most crucial variables that influence changes in organisational behaviour studies. Brandts and Copper (2007), Oprea et al. (2014) and Brandts, Root and Sola (2016) state that communication is efficient in resolving coordination issues in collective structure. A number of previous researches have demonstrated the positive impact of communication on group members' cooperation and, hence, group's outcome (Isaac and Walker, 1988; Chaudhuri and Paichayontvijit, 2010; Brandts, Cooper, and Weber, 2015). Leaders can interact with their followers using two main forms of communication, which are written messages (Cooper et al., 1996; Brandts and Cooper, 2007) and face-to-face communication (Ostrom et al., 1992; Ostrom and Walker, 1997). In particular, written messages can be one-way (leaders send the messages to group members) or two-way (leaders send messages to group members and vice versa) (Brandts and Cooper, 2007). Additionally, messages can either have restricted form (Cooper at al., 1996; Oprea et al., 2014) or free-form (Oprea et al. 2014). In our study, leaders can send free-form messages to group members in order to motivate them to contribute more to the public good. No matter which form it might take, communication is undeniably an efficient tool for leaders and managers to enhance and sustain collaboration between team's members and, hence, its productivity (Levy et al. 2011; Oprea et al. 2014).

Text analysing can provide an insight into leadership and organisational performance in a series of precedent literature. Bono and Ilies (2009) find that pronouns, articles, numbers, and non-substantive words account for almost 50% of words used by leaders. In addition, they show the positive relationship between leaders' positive emotional expression with followers' moods and, hence, the effectiveness of groups' work. Hamman, Weber, and Woon (2011) analyse messages sent out by leaders and realise that groups with leaders using more collective language contribute more to the public good than other groups. Besides, they also find that leaders, whose messages are more relevant to groups' payoffs, tend to be more effective than other leaders. In our research, we not only link the leader's message to

group's performance but we also want to correspond leader's personality with language that s/he uses to communicate with her followers. There is vast literature in psychology and sociology that has already analysed how characteristics of an individual reflect his or her writing style and language use (Darbor et al., 2016; Tausczik and Pennebaker, 2010; Pennebaker et al., 2003). However, this aspect has not been well captured in experimental economics.

In order to measure personality dimensions of participants, we employ a wide range of personality and ability tests consisting Big Five (John and Soto, 2017), Cognitive Reflection Test (Frederick, 2005), Psychopathy Personality Inventory (Lilienfeld and Andrews, 1996) and Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995), math skill test (Gaudeul and Keser, 2017). All of these tests will be conducted in z-tree, which is a. We also design some other tests on Qualtrics with a view to obtaining further characteristics of participants such as Holt and Laury test (Holt and Laury, 2005), loss aversion test (Brink and Rankin, 2013), ambiguity aversion (Krahnen, Ockenfels, and Wilde, 2013), social value orientation (Murphy et al., 2011), Raven test (Raven and Court, 1998), Machiavellianism test (Christie and Geis, 1970), BFMS test (Bartling et al., 2009), social intelligence test (Khorashad et al., 2015).

Leaders, in our research, are selected as specified in chapter 1 (Nguyen and Chmura, 2020). We believe that such mechanism of choosing leaders can offset weaknesses of random selection process as well as promote the legitimacy of leaders. In previous literature, leaders are selected either exogenously or endogenously. In the former type of leadership, a random group member is chosen to become the power holder while, in the latter type, team members have to carry out a poll and the one with highest of number of votes becomes the leader. Hamman, Weber and Woon (2011) and Brandts, Cooper and Weber (2015) criticise randomly selected leaders for being non-democratic and support the dominant influence of voted leaders on elevating the total outputs of groups. However, in some cases, voters select individuals that uphold similar values or characteristics to them and are not necessarily the most efficient ones. Therefore, herein, we combine the random process of selecting leaders with a salary offering mechanism so as to eliminate or reduce weaknesses of both exogenous and endogenous leadership. Additionally, prior to making choices of leaders, followers in our study are provided with written abstracts of potential leadership candidates. Those pieces of information bear resemblances to resumes that applicants submit to employers when they apply for job vacancies. Arnulf, Tegner and Larssen (2010) mention that resumes aid the process of screening for suitable candidates become more efficient, effective and less time-consuming for recruitment staffs and departmental managers.

All treatments of our research are built in public good environment, which is widely used in various studies on social dilemma and maximizing payoffs in organisations. Earliest public good literature can trace back to Marwell and Ames (1979) and Ledyard (1994). A standard public good game comprises of four players with initial endowment and they are required to decide how much they are willing to contribute to the public good. For any unit contributed, it produces a marginal per

capital return (MPCR) of 0.5, which is a measure of what an individual gets back from one-unit contribution to the public good (Davis and Holt, 1993), while, for each retained unit, the player earns a return of 1 (Ramalingam et al., 2016). Leader-member is a variation of public good game in which a member is chosen to become the power holder and set his or her influence on followers with an ultimate goal is to incentivise them to contribute more to the public good and, thus, improve mutual benefits as a whole. Such design has been employed in a number of studies to explain why leadership is an important solution to social dilemma (De Cremer, 2000) as well as highlight the usefulness of installing group leaders into organisational settings to enhance collective productivity (Levy et al., 2011; Oprea, Charness and Friedman, 2014; Hamman et al., 2011).

Z-tree (Fischbacher, 2007) and Qualtrics (Qualtrics, Provo, UT) are two programs for experiments we are going to employ in this research. Z-tree is a popular software package for designing experiments in economics. It operates on client-server principle in which server computer is for the experimenter and client computers are for subjects. Qualtrics, on the other hand, is a powerful online platform for designing and conducting surveys. In our research, while tests of Big 5, psychopath, cognitive reflection, and math skill are conducted in z-tree, other tests are delivered in Qualtrics. Regarding how to find participants for experiments, we employ ORSEE (Greiner, 2015), which is an online recruitment system specialised for economic experiments, to recruit students from the University of Nottingham's pool of subjects.

In the next sections of our study, we firstly present related literature on leadership, communication, individual personalities, voting mechanism, and public good game. Then, we describe experimental design that we are going to use for the experiments before presenting the results of each treatments as well as providing further discussion on them. Finally, we aim to summarise our findings and provide indications for future studies. We expect our research can contribute to current literature a linguistic insight into leader's communication and its impact on group members' behaviour. Besides, we aim to highlight the significance of leadership in organisational structure and the link between participants' characteristics and their uses of language. Our study is among the first attempts in experimental leadership that focus on the linguistic aspect of leadership communication and its effect on cooperative behaviour.

Based on what have been discussed, the research questions for this chapter are stated as below:

_ How differently do group members offer salaries to passive leaders and communicating leaders?

_ What do characteristics of written abstracts determine group members' salary offers?

_ Is there any difference in efficiency between leaders sending common messages and leaders sending individual messages?

_ What are qualities of effective messages and how do they influence leadership election?

II. Literature

Besides rewarding power and output allocation authority, communication is also deployed by leaders to improve and maintain cooperation among group members in public good game experiments. Oprea, Charness and Friedman (2014) state that a rich communication can solve coordination problems almost entirely with no sign of deterioration over time. In previous studies, leaders are recorded to communicate with her followers mainly by sending unilateral messages at the beginning of each period to either suggest contribution level (Levy et al., 2011) or encourage group members to exert more efforts (Brandts, Cooper, and Webber, 2015). It is found in both of these papers that leader's communication has a significant positive effect on followers' behaviour and group's performance. Similar results are reported in Brandts and Cooper (2007), Hamman et al. (2011) and Brandts et al. (2014). It is, nevertheless, worth examining additionally the impact of both common messages – leader sends the same message to all group members – and individual messages – leader sends different messages to each group members – on individuals' taking action.

In health studies, the difference between common messages and individual ones has been examined by a number of scientists such as Marcus et al. (1998), Carindal and Sachs (1996) and Spittaels et al. (2007). Although there has not been clear evidence on the complete dominance of individual messages over common messages, it is consistently found that tailored messages have a positive correlation with recipients' taking action. This is possibly because tailored messages are constructed in a way that is well-suited to individual needs or situations (Latimer, 2010). In our study, we have treatments where leaders send common messages as well as treatments where leaders send individual messages with an aim to compare the effect of each type of message on individual behaviour. We also want to provide strategic indication for human resource management on how leaders should communicate with their followers to unite group members in exerting more effort on common tasks.

Text analysing is also important to understanding the influence of leader's communication on laggards' behaviour. Brandts, Cooper and Weber (2015) quantify the messages sent by leaders to evaluate the relevance of them to the play of the game, which then helps explain the difference in group performances. By employing research assistants, who are supposed to make assessment of leaders' written messages, Brandts et al. (2015) manage to demonstrate the effect of leader's communication on group's work. In addition, Bono and Iles (2006) presents that almost 50% of words used by leaders include pronouns, articles, number, and non-substantive words and Linguistic Inquiry and Word Count 2015 software (Pennebaker et al., 2005) is used to count the number of words used by leaders.

Linguistic Inquiry and Word Count (LIWC) was firstly developed as part of Francis and Pennebaker's study of language and disclosure in 1993. After two and a half decades of being updated and expanded, LIWC is now in its third version – LIWC 2015 - and has become one of the most well-known text analysis applications in the world. LIWC (2015) provides an efficient and effective platform for analysing emotional, cognitive, and structural dimensions of individuals' speaking and writing (Pennebaker, et al., 2015). By accessing different text files of various formats and processing them on a line by line basis, the application detects target words and compares them with its internal default dictionary. In case a target word matches with a dictionary word, the relevant word category scale is incremented by one. It is important to note that one target word can be classified into multiple categories of words at the same time. The word analysis results from LIWC2015 are the generated and compacted into CSV files for further uses such as running regressions or constructing statistics tables.

In linguistics and psychology, Tausczik and Pennebaker (2010) and Darbor et al. (2016) highlight the link between individual characteristics and one's use of language. Pennebaker and King (1999) prove that people with neuroticism use more negative words and less positive emotion ones. Opposite findings are reported for extrovert people, who use more positive wordings as well as language of social processes. Ickes et al. (1986) find that individuals with Machiavellianism employ more first-person singular pronouns implying that they tend to be self-focused. In addition, Rieber and Vetter (1995), Ticker and Rosenberg (1975), and Oxman et al. (1982) attempt to find the link between one's wording with psychopathy and other clinical disorders if there is any. In our research, we investigate how the difference in personality explains the variation in written messages by selected leaders and whether this difference results in diverse outcomes among experimental groups.

To elicit individual personalities, we employ a wide range of tests including big 5 (Costa and McCrae, 1992), psychopathy (Levenson, Kiehl, and Fitzpatrick, 1995), risk preferences (Holt and Laury, 2005), loss aversion (Brink and Rankin, 2013), ambiguity aversion (Krahnen, Ockenfels, and Wilde, 2013), social value orientation (Murphy et al., 2011), Machiavellianism (Christie and Geis, 1970), and BFMS test (Bartling et al., 2009).

Big Five personality test examines five dimensions, which are Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience. Neuroticism refers to emotional stability and low anxiety even though one suffers from negative effects (Pervin, 1989; Barrick and Mount, 1991). Extraversion reveals the extent to which a person is sociable, confident, energetic and talkative (Greenidge, 2013). Conscientiousness tells how much an individual is organised, determined, purposeful, plan and achievement oriented, efficient, thorough, responsible and reliable (Nguyen and Chmura 2020). Agreeableness indicates the cooperative, considerate and friendly aspects of individual personality (Nguyen and Chmura, 2020). Last but not least, the Openness to Experience measures one's curiosity of intellectuality, imagination and creativity (Burger, 2008; John and Srivastava, 1999). In this chapter, after collecting data on participants in experiments, we compute Cronbach's alpha for each dimension of the Big Five test to examine if it is a reliable

test. The Cronbach's alphas for openness to experience, conscientiousness, extraversion, agreeableness and neuroticism are equal to 0.69, 0.66, 0.65, 0.72 and 0.69, respectively. We, hence, confirm that the Big Five test provides a stable measure of personalities for participants in our experiments.

Psychopathy has received diverse ideas from scientists about its effect on individual collaborative perception. While Lange and Osterheider (2008) characterise psychopathy as selfishness, misleading conduct, and reckless intention to exploit other people, Osumi and Ohira (2010) deploy Psychopathy Personality Inventory (Lilienfeld and Andrews, 1996) and Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995) to demonstrate how the psychopathic might be rational and cooperative in some situations. While Psychopathy Personality Inventory (PPI) is developed from a wide range of concepts and theories on psychopathy and comprises 160 items, Levenson Primary and Secondary Psychopathy Scales is a 26-item self-report measurement consisting of two sub-scales: (1) Primary Psychopathy (16 items) and (2) Secondary Psychopathy (10 items). In addition, Babiak, Neumann, and Hare (2010) find that psychopathic people possess strong communication skill, persuasion, and interpersonal skill, which altogether enable them to surpass difficulties in their career.

Risk preferences, loss aversion, and ambiguity aversion have been investigated in various researches in experimental economics with a view to explaining how these influence decision making process and, therefore, the contribution to the public good. Tyessier (2012) finds that people with high risk aversion tend to contribute less to the public good while Glöckner and Hilbig (2012) state that risk aversion helps predict higher level of cooperativeness in social dilemma. McCarter et al. (2010) highlight the negative correlation between loss version and contribution to common pool of benefits. Individuals with high ambiguity aversion also exhibit free-riding behaviour in public good game as stated in Gangadharan and Nemes (2009). In terms of human's orientations of social value, Murphy et al. (2011) have divided them into altruism, pro-sociality, individualism, and competitiveness. While altruism is a dominant quality of servant leadership and helps distinguish this leading style from others (Dennis et al., 2010), pro-sociality is said to be one of the first and foremost criteria when it comes down to selecting leaders (Hamman et al., 2011 and Lorenzi, 2004). Machiavellianism was firstly introduced by Christie and Geis (1970) and described as a lack of morality, trust in people, and interpersonal connections. While some scientists cast doubt on Machiavellianism as a predictive factor of good leadership, Drory and Gluskinos (1980), Mumford et al. (2001) show that individuals with high Machiavellianism have better task performance, higher effectiveness, and dominant contribution to group advancement. Last but not least, social preferences, which are revealed by test of Bartling et al. (2009), also play a decisive role to collective productivity. A person is said to be egalitarian if s/he minimises pay-off inequality (Capraro et al., 2017). This implies that egalitarian people will contribute more to the public good if other group members do so. In case other team members free ride, egalitarian individuals will retaliate by contributing less or nothing at all (Johnson et al., 2009). Fehr and Schmidt (1999) and Falk, Fehr and Fischbacher (2005) report similar results and highlight that egalitarian

people are also those with highest reciprocity. Capraro et al. (2017) dictate a person to be spiteful if s/he maximises his or her own benefit be decreasing the other's pay-off. Spiteful group members are, hence, predicted to be less cooperative than others and deteriorate collective performance. Self-interested individuals are those who only care about maximizing their own pay-offs and neglect others' benefits (Capraro et al., 2017). Although self-interested people do not optimise their own benefits by reducing others' benefits, they have tendency to act selfishly and inefficiently.

To elicit participants' abilities, we require them to take math test (Gaudeul and Keser, 2017), cognitive reflection test (Frederick, 2005), social intelligence (Khorashad et al., 2015), and fluid intelligence (Raven, and Court, 1998). The link between mathematical skill and leadership has been long studied. While Kuhn and Weinberger (2005) suggest that there is no clear evidence on the association between one's math score and his or her leadership ability, Gaudeul and Keser (2017), in an experimental study, prove that selected leaders are likely those with better mathematical performances. Cognitive ability is essential to a good leader as it accounts for a large portion of her daily activities (Carroll and Gillen, 1987). So as to measure one's cognitive ability, Frederick (2005) design Cognitive Reflection Test (CRT) to learn individual selections that are featured in decision-making theories. Social intelligence refers to the ability to perceive social requirements and select appropriate responses to situational demands (Zaccaro et al., 1991). An efficient leader is supposed to be flexible and adaptable to all kinds of social environments and leads organisation through challenges and obstacles (Bell and Hall, 1954; Zaccaro et al., 1991). Fluid intelligence is used by Cattel (1963) to refer to analytic intelligence, which is defined as the capacity to rationalise and find solutions to problems that involve new information without falling back on prior knowledge. Progressive Matrices Test by Raven and Court (1998) is a popular method for eliciting individuals' fluid intelligence.

Leader selection also affects followers' behaviour and, hence, the final performance of the group. A large number of studies have reported the increased levels of contributions to public good games with the presence of leaders. Within these studies, leaders can be chosen either exogenously or endogenously. While Dannenberg (2015), Moxnes and Heijden (2003) exogenously selects a player to become group leader, Rivas and Sutter (2009) employ endogenous leadership in their experimental study on the positive effects of voluntary leader on public good game. Furthermore, Brandts, Cooper, and Weber (2015) propose the concept of legitimate leaders to describe those who are endogenously nominated by group members. This leader type, therefore, can be even more effective and influential in terms of incentivizing followers to exert more efforts (Nguyen and Chmura, 2020). In the current research, we combine selecting leaders at random with offering salaries to these leaders with a view to offsetting weaknesses of exogenously forced leadership and reflecting team members' preferences over candidates for leading positions. In particular, five participants are randomly selected as potential leaders before group members decide the amounts (expressed as percentage of group's final output) they are willing to pay for those leadership candidates as salaries. Abstracts, which are written by potential leaders to address the question why they should be selected, are presented to group members in

advance in order to help them recruit the best leaders for their groups. The written paragraphs play a similar role to short CVs or resumes that reveal more information about each candidate for leading position. According to Brandts, Cooper and Weber (2015), subjects, whose messages encourage collaboration, are more likely to be chosen as leaders.

Public good game (Marwell and Ames, 1979) has been long deployed in behavioural and experimental economics to learn social dilemmas and organisational problems. Levy et al. (2011) and Brandts et al. (2015) apply public good game in their studies to examine collective outcome as well as the incentive to maximise common payoffs. In its original design, public good game involves four players with initial endowments. They next have to decide how much to contribute to a common pool of benefit. The contributed amounts are then multiplied by 1.5 (Ertac and Gurdal, 2012), resulting in a marginal per capital return (MCPR) of 0.5 (Davis and Holt, 1993), and the final output is equally redistributed to each player. On the contrary, the amounts kept by the players will be multiplied by 1 (Ramalingam et al., 2016) and not be distributed to other group members. Assumptions on selfishness and rationality dictate that players tend to shirk or free ride and contribute nothing at all. However, experimental evidences show that participants contribute more or less 50% of their endowments on average (Chmura, 2018; Ramalingam et al., 2016).

Qualtrics (Qualtrics, Provo, UT) and z-tree (Fischbacher, 2007) are used to design our experiments. Qualtrics (Qualtrics, Provo, UT) is a powerful tool that provides an online platform for designing and conducting surveys for both academic and industrial purposes. In our sessions, as mentioned in the previous section, Qualtrics is used to conduct tests for risk preferences, loss aversion, ambiguity aversion, social value orientation, social preferences, social intelligence, analytical intelligence and Machiavellianism.

Besides, z-tree (Fischbacher, 2007) is a well-known software package designated for programming experiments in economics. It has been used in hundreds of studies that employ experimental methodology to investigate decision making process as well as behaviours of human-beings facing economic problems and dilemmas. Gächter and Renner (2018) employ z-tree to program experiments for investigating the role of leaders in social dilemma and shaping others' beliefs. Nosenzo and Sefton (2014) and Drouvelis, Nosenzo and Sefton (2017) also use z-tree to design their experiments to study the impact of centralised incentive systems on public good game's outcome. Further in the past, Güth et al. (2007) program their experiments with z-tree to document the comparison between leading by example with authority and without authority. In the current research, z-tree is employed to run the main parts of our experimental design. It is also used to conduct tests for personality traits, psychopathy, cognitive abilities and mathematical skills.

ORSEE (Greiner, 2015) is an online recruitment system for economic experiments. As more and more studies in experimental economics are conducted, the demand for an effective way to recruit and maintain pools of participants for academic experiments also increases. Hence, ORSEE is introduced as a solution to such demand and facilitate the development of an emerging field of study in economics. In this

documentation, we employ ORSEE (Greiner, 2015) to recruit participants from the University of Nottingham's pool of subjects and to make laboratory booking for running experiments.

III. Experimental Design

Our experiments are designed with the purpose of examining the influence of communication on organisational members' contribution to the public good and, hence, the final outcome of that organisational structure. In addition, we also want to investigate how different types of communications vary the total contributions to the public good. The content of communication between leaders and group members is also examined to gain in-depth knowledge of languages used by leaders in persuading and incentivizing their followers. We believe our design is of interest of politicians, management experts, psychologists, and economists.

As mentioned in chapter 1, we have conducted 7 treatments in total at the Centre for Research in Behavioural Sciences (CRIBS) of the University of Nottingham in the UK. We continue to use z-tree (Fischbacher, 2007) and Qualtrics (Qualtrics, Provo, UT) to design our experiments and surveys. Participants are recruited through ORSEE (Greiner, 2015) and payoff conversion rate is 108 ECU/£. We employ four treatments for the current study, which are treatments *LP*, *LCC*, *LIC*, and *LCCH*. Descriptions of these treatments are presented as the following:

- **Treatment 2 *(LP)*:** voted leaders, and equal share of output among members
- **Treatment 4 *(LCC)*:** voted leaders, equal share of final output among members, leaders send common messages to group members
- **Treatment 6 *(LIC)*:** voted leaders, equal share of the final output among members, leaders send individual messages to group members
- **Treatment 7 *(LCCH)*:** voted leaders, equal share of the final output among members, leaders see the overall happiness of group members with them and send the common messages

Details of *LP* can be referred to in chapter 1. In treatment *LCC*, we firstly ask fourteen recruited participants to complete a series of tests on characteristics and abilities which are Big 5 (McCrae and Costa, 1992), psychopathy (Levenson, Kiehl, and Fitzpatrick, 1995), cognitive reflection (Frederick, 2005), mathematics (Gaudeul and Keser, 2017), risk preferences (Holt and Laury, 2005; Dohmen et al., 2011), ambiguity aversion (Krahnen, Ockenfels, and Wilde, 2013), loss aversion (Brink and Rankin, 2013), Social Value Orientation (Murphy et al., 2013), Analytical Intelligence (Raven and Court, 1998), social preferences (Bartling et al., 2009) and social intelligence (Khorashad et al., 2015). Next, all participants are required to write a short paragraphs addressing if they want to be the group leaders and why they should be chosen by group members. Details of tasks selected leaders are expected to perform are well mentioned in the experimental instructions. Then, five potential leaders are randomly selected from fourteen participants while non-selected ones are assigned at random into groups of three. In the next stage, paragraphs (also called as abstracts) that are written by

leadership candidates are presented to group members individually. Appropriate amount of time is provided for each group member to read all abstracts one by one before they proceed to the next stage where they are required to make salary offers to potential leaders. In order to aid group members in recalling each potential leader's writing, we display their paragraphs again besides salary offers boxes on the z-tree screens (*Appendix 3*). Once participants identify how much they would like to offer to each leadership candidates, they input relevant amounts in provided spaces. Group members are noted in both experimental guidelines and z-tree screens that the amounts they input are in percentage of their groups' final outputs and the maximum amount each of them can input is 10% while the minimum amount is 0%. The total salary a leader receives is equal to the total of all salary offers made by three members of the group that leader chooses to lead and the formula is presented as below:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3}$$

where, w_{Li}: the earnings (in percentage of final output) for leader *i.*

$L_{i,j}$: the salary offer (in percentage of final output) made to leader *i* by member *j*. Noted that $L_{i,j}$ lies within [0,α], where $\boldsymbol{\alpha}$ is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

After the voting stage, two leaders, who are unable to choose groups to lead, stop their experiment temporarily. Other leaders and their groups proceed to playing the public good game in which each of them is initially endowed with an initial wealth of 20 experimental currency units (ECUs). They, except for the leaders, then decide how much to contribute to common good. Each ECU donated to the public good produces a marginal per capital return (MPCR) of 0.5 (Davis and Holt, 1993) while any unit of experimental currency retained in players' own pockets earns a return of 1 (Ramalingam et al., 2016). This is why public good game is also sometimes referred to as public investment game. Once everyone has made their contributions, the experiment continues and participants, including the leaders, are able to observe their incomes for the current period as well the overall performances of their own groups. While the profit of each leader is calculated using the aforementioned formula, the calculation of group members' profits in each period is as below:

$$w_j = a - L_{i,j} + p/3$$

where, w_j: the earnings (in percentage of final output) for group member *j* (*j*=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary (in percentage of final output) for leader *i* (*i*=1, 2, 3, 4, 5) by group member *j* (*j*=1, 2, 3).

p: group's remaining output (in percentage) after paying $\boldsymbol{\alpha}$.

Group members, in this stage, are also requested to state their happiness (also called satisfaction) with their leaders. The rating scale ranges from the lowest level of 1 to the highest level of 5. Also, leaders can see the contribution levels of each group member. As the experiment proceeds, leaders compose a common message for all group members with a view to encouraging them to contribute more to the public good. This common message is then shown to all group members in the very next stage. After reading the message, group members and their leaders return to the public good game stage and then repeat subsequent stages that they have done in the first period. Especially, at the end of the 15th period, after observing the message sent out by the leader, members in each group have a chance to decide if they want to keep or remove their current leader. There will be a game restart after this stage and participants are not informed about this in advance. We provide the flow chart of all stages in *LCC* as well treatments *LIC* and *LCCH* below.

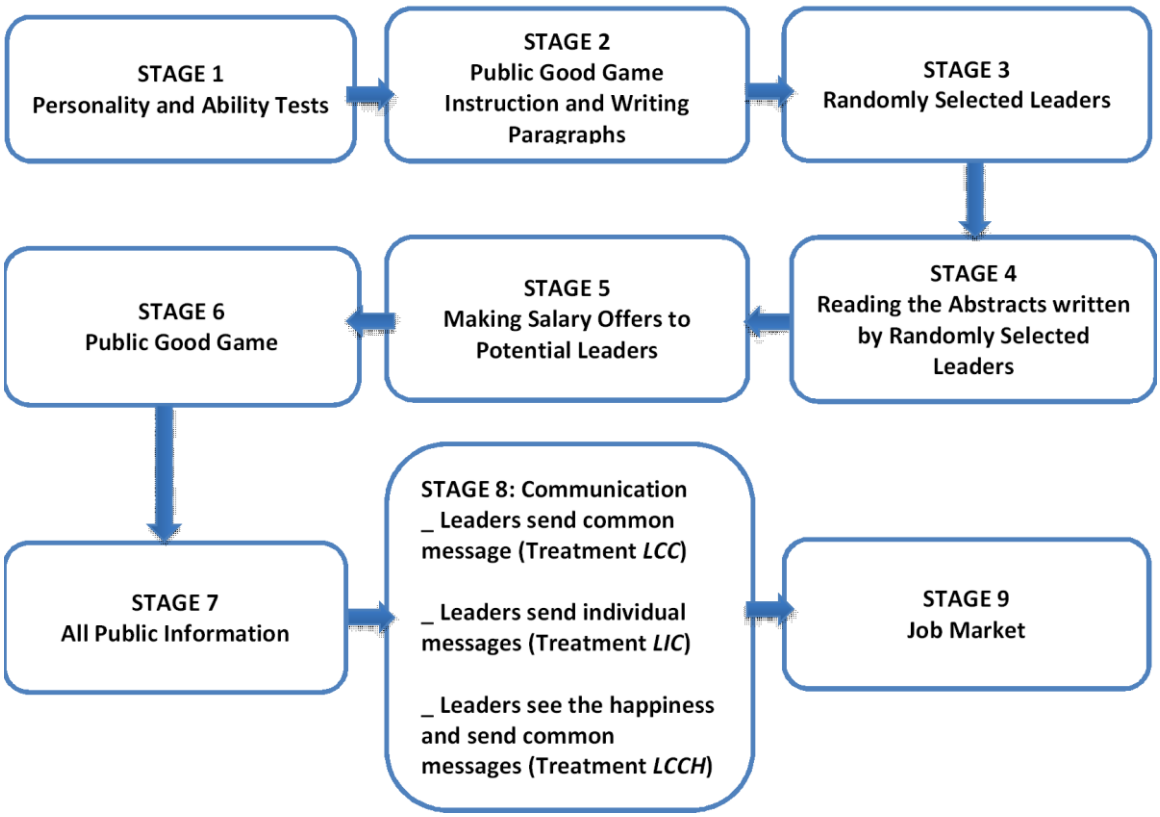


Figure 4: Flow chart of stages in treatments *LCC*, *LIC*, and *LCCH*.

As you can see from the flow chart, most of *LCCH*'s stages are similar to *LCC*, apart from stage 8. In *LCCH*'s stage 8, leaders will see the average satisfaction levels all group members with them. This type of information is important to leaders as it not only shows how other group members feel about them but it also affect leaders' behaviours, especially their efforts in leading and uniting group members through

sending common messages across periods. After observing satisfaction level of her group, the leader communicates with three group members so as to update information about group's performance or incentivise them to work harder in the next period. Since we apply free-form messages in our design, leaders have all freedom to compose their messages. Levy et al. (2011) and Brandts et al. (2016) also employ free-form messages in their communication treatments. The advantage of free-form messages is that they allow composers to write in their own styles and discuss a wider range of issues they think are important for encouraging team members to contribute more to the public good and cooperate better to sustain social efficiency. Experimental instructions for both *LCC* and *LCCH* can be found in *Appendix 10.*

In *LIC*, the design is also similar to treatments *LCC* and *LCCH*. Nonetheless, leaders in *LIC* send individual messages, which is different from treatments *LCC* and *LCCH*, and they cannot see how happy, on average, group members are, which is different from leaders in *LCCH*. Unlike common message treatments, each leader in *LIC*, after observing their incomes, groups' performances, and contribution levels of each follower in stage 8, can send up to three different messages to three group members. Depending on performance of each member, the group leader can write and send messages with different content to call for more contributions or to compliment on generous donations, for example. Herein, we also employ free-form text messages design in order to provide leaders with more freedom to write what they want to transmit to their followers. Besides, pre-programmed messages or expert advices, which are employed in previous studies, are found to have no influence on recovering cooperation between group members (Brandts et al., 2016). Each group member will then read the message that is tailored for him or her individually. After finishing reading these messages, participants return to stage 6, which is the public good game stage. They also repeat subsequent stages of the experiment that they have done in the first periods for at least another 15 periods. At the end of the 15^{th} period, group members can also decide whether to keep or remove their current leaders. Written abstracts of leaders are displayed again in stage 9 so that group members, in case they want to remove the current leaders, are able recall other possible substitutes for leading positions. Once they decide to remove the current leader, each follower is also asked to input a new leader choice. After this, the game is restarted without participants' knowledge. They will perform the same stages and procedures in the restarted game. However, they are not required retake personality and ability tests. Experimental instructions for *LIC* are supplied in *Appendix 10.*

Based on our experimental design for the second chapter, we justify and present all hypotheses we want to test as the followings. Hypothesis 1 examines the difference in salary offer between passive leaders and leaders with communication role. Levy et al. (2011), Brandts et al. (2016) highlight the importance of leaders' communication for improving cooperation among individuals. Hence, we expect that leaders with communication role receive higher salary offers than passive leaders as they are more efficient in enhancing collective outcomes.

Hypothesis 1: *Leaders with the roles to send messages to group members receive higher wage offers than passive leaders.*

In the second hypothesis, we want to investigate the influence of written abstracts on the amount of salary offer each leadership candidate receives in the voting stage. Daft (2008) content leadership creates vision and strategy for followers to achieve success. In terms of social characteristics, leaders are those with high level of cooperativeness and sociability. Therefore, we conjecture that potential leaders whose abstracts are more visionary and cooperative and sociable.

Hypothesis 2: Higher wage offers are given to leaders that write *more visionary, sociable and cooperative abstracts.*

Health studies have been long investigating the effects of individual messages and common messages on patients' behavioural shift. It is consistently found that individual messages are more effective in recovering patients' health as they are tailored-made and more relevant to patients' specific conditions (Latimer et al., 2010). Hence, we expect to see a difference in efficiency between leaders sending common messages and leaders sending individual messages. Also, we are interested in discovering different languages used by leaders when they compose common messages and when they compose individual messages. Hypotheses 3 and 4 are, therefore, documented as below*:*

Hypothesis 3: *Individual communication is more effective in increasing group efforts, in comparison to common communication.*

Hypothesis 4: *The quality of messages matters to the groups. Selected leaders, who send more incentive, cooperative, and affectionate messages, elevate groups' overall performances far better than other selected ones.*

Finally, we want to examine the influence of leaders' abstracts on the likelihood that they are selected in the second phase. Similar to hypothesis 2 of this chapter, we want to see how written abstracts affect the selection of leaders. Authenticity of leadership is a constituent of successful leaders (Gardner et al., 2009) while cooperativeness is important for organisational success (Gächter et al., 2012). Findings on the relationship between risk preferences and leadership ability are mixed and demand further studies. Hypothesis 5 is, thus, presented as the following:

Hypothesis 5: *Leadership candidates writing more cooperative, risk-averse and authentic abstracts are selected as leaders.*

IV. Data Analysis and Discussion

1. Leaders with communication role and passive leaders

Hypothesis 1: *Leaders with the roles to send messages to group members receive higher wage offers than passive leaders.*

In this hypothesis, we compare the average salary offers to leaders (expressed in percentage of the group's final output), who are voted and send messages to group members, with the average salary offers to passive leaders, who are voted but will not perform any task. In order to achieve this goal, we firstly calculate the average salary offers of all groups for each potential leader in the voting stage. Next, we apply Mann-Whitney test (U-test) to see if we can draw conclusions on the differences in average salary offers between investigated treatments. Since each group makes offer at the beginning of each experimental phase (15 periods for each phase), we compare data of offers in the first phase, second phase, and throughout both phases. Data on offers of treatments *LP*, *LCC*, *LIC*, and *LCCH* are employed to obtain results for current hypothesis.

	Observations	**Phases**		
		Periods 1-15	**Periods 16-30**	**Periods 1-30**
Average offers of all groups (Treatment *LP*)	10	14.1 (11.68522)	16.1 (9.631545)	15.1 (8.704405)
Average offers to all groups (Treatment *LCC*)	10	19.99 (6.286573)	20.4 (2.401388)	20.195 (3.200994)
p-value		0.1986	0.4703	0.0818*

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 11: Comparison of average salary offers (in % of final output) between treatments *LP* and *LCC*.

As can be seen from the *Table 11*, between treatments *LP* and *LCC*, we find no statistical evidence on the difference in average salary offers to potential leaders in each experimental phase. However, it is noticed that the average salary offer in *LCC* is higher than those in *LP* in both phases. While, in the first phase, average salary offer in *LP* is 14.1%, the average salary offer in *LCC* is 19.99% with less variation. In the second phase, groups in *LCC* offer, on average, 20.40% of final outputs while *LP*'s groups only offer 16.1% on average with higher variation.

When we compare the average salary offers of both phases, however, we find that the average salary offers to potential leaders in *LCC* are statistically higher than the average salary offers to potential leaders in *LP*. The p-value of the U-test is 0.0818, which is lower than the chosen significance level. On average, *LCC*'s groups throughout both phases offer more than 20.00% of final output while *LP*'s groups offer an average amount of approximately 15.00% of final output. The variation in offers of *LP*'s groups is higher than variation in offers of *LCC*'s groups.

Table 12 shows statistics and results of U-test on average salary offers to potential leaders by groups in *LP* and *LIC*. Similar to what we have done above, we deploy Mann-Whitney test to investigate the difference in average salary offers between *LP* and *LIC*. We also present our findings in three different time spans, which are 1-15 periods, 16-30 periods, and then throughout both phases in the below table. The total number of observations is ten since we select five random participants in each phase to become leadership candidates.

	Observations	**Phases**		
		Periods 1-15	**Periods 16-30**	**Periods 1-30**
Average offers of all groups (Treatment *LP*)	10	14.1 (11.68522)	16.1 (9.631545)	15.1 (8.704405)
Average offers of all groups (Treatment *LIC*)	10	25.5 (11.56864)	22.44 (11.20181)	23.97 (10.25674)
p-value		0.0340**	0.4044	0.0586*

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 12: Comparison of average salary offers between treatments *LP* and *LIC*.

It can be seen that, in phase 1, there is strong evidence on the significant difference in average salary offers to potential leaders between treatments *LP* and *LIC* (*p-value = 0.0340*). In addition, *LIC*'s leaders, whose tasks are to communicate individually with each group members at the end of each period, receive higher salary offers, on average, from all experimental groups with the mean value of 25.50% of the final output. This figure is significant higher than that of *LP*'s leaders, who only receive 14.10% of the final output.

In phase 2, however, we find no statistical difference between average salary offers of *LP* and *LIC* (*p-value = 0.4044*) even though the average salary offers of *LIC* (μ = 22.44%) is still significant higher than that of *LP* (μ = 16.10%).

Overall, when we compare the two-phase average salary offers of the two treatments, we find that there is statistical evidence to conclude that average salary offers of *LP* is different from those of *LIC* and lower than those of *LIC*. While the

average salary offer of *LP* is 15.10% of the final output, the average salary offer of *LIC* is 23.97% of the final output.

Based on results of comparisons above, we are able to conclude that leaders with communication roles receive higher offers than passive leaders. This is supported by existing literature in experimental economics and management studies. Leaders with communication role are consistently found to be able to recover and boost performances of groups (Brandts and Cooper, 2007; Brandts, Root, Sola, 2015) while Pelz (1952) and Tannenbaum (1962) highlight that powerless leader can almost do nothing for their subordinates. Hence, it can be implied that group members should realise the importance of communicating leaders and offer higher salaries to them so that these leaders would exert more efforts on elevating groups' performances.

Result 1: *Leaders in communication treatments receive higher salary offers from group members than leaders with no influence on followers.*

2. Potential leaders' written abstracts and the offers from group members

Hypothesis 2: *Higher wage offers are given to leaders that write more visionary, sociable and cooperative abstracts.*

In hypothesis 1, we investigate if the role and importance of leaders influence their offered salaries. Besides, we also want to examine if leaders' written abstracts affect their earnings. It is important to note that group members read the abstracts written by potential leaders before they make salary offers. These abstracts supply useful information to group members about each leadership candidate's characteristics. Hence, analysing abstracts' content would help us understand more about determinants of leaders' salary offers.

In order to achieve our goals in the current hypothesis, we employ Linguistic Inquiry and Word Count 2015 (Pennebaker et al., 2015) or, in short, LIWC2015, which is a popular software for analysing text and has been employed widely in previous researches in leadership, psychology, sociology, and linguistics. We firstly need to select dimensions we want to use during analysis of potential leaders' written abstracts. Each dimension is a variable or word category embedded in the software package. In its latest version, LIWC 2015 offers up to 90 output variables, which belong to different word categories such as psychological process (e.g., positive emotion, affect, drives), personal concerns (e.g., work, leisure activities) or time orientation (e.g., focus on past, focus on present) (Pennebaker et al., 2015). Based on existing literature on languages used by leaders (Bono and Ilies, 2006; Hamman et al., 2011), we select relevant word categories given in LIWC2015 before importing the written paragraphs of leadership candidates for text analysis (*Appendix 5*). Results generated by the software are next recorded in word counts, which facilitate our quantitative research substantially. Then, we regress the average salary offers to leaders on the word counts of each dimension of written abstracts. We present regression results in the table below and we also divide our reporting into three different time spans, which are 1-15

periods, 16-30 periods, and 1-30 periods. Note that treatments *LP*, *LCC*, *LIC*, and *LCCH* are used in this hypothesis.

Variables	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Word count	.685102 ***	.2212667	.4531844***
	(.1385058)	(.1577581)	(.109776)
Impersonal pronoun	-1.116393*	-1.482857*	-1.299625 **
	(.6386946)	(.7274733)	(.5062126)
Article	.407864**	.1331686	.2705163**
	(.1650461)	(.1879876)	(.1308112)
Interrogative	-4.254884***	-2.538528**	-3.396706***
	(1.071878)	(1.220869)	(.8495424)
Affect	-.2663668 *	-.0792149	-.1727908
	(.1373462)	(.1564373)	(.108857)
Anxiety	-3.538354**	-3.899738 **	-3.719046***
	(1.565904)	(1.783565)	(1.241095)
Social	-.8208113***	-.9810396***	-.9009254 ***
	(.2097115)	(.2388614)	(.1662118)
Male	5.008541***	3.345978**	4.17726***
	(1.108181)	(1.262218)	(.8783153)
Cognitive process	-.9613258***	-.7305472 ***	-.8459365***
	(.1779263)	(.2026581)	(.1410197)
Discrepancy	1.480826***	1.330144**	1.405485***
	(.433146)	(.4933534)	(.3433002)
Affiliation	1.429195 ***	.9474972**	1.188346***
	(.3339977)	(.3804235)	(.2647179)
Differentiation	1.199872*	2.209816 ***	1.704844 ***
	(.6025423)	(.6862958)	(.4775593)
Reward	-.6257939***	-.8564633 ***	-.7411286***
	(.197113)	(.2245118)	(.1562266)
Risk	1.926335**	2.361497**	2.143916***
	(.8587693)	(.9781384)	(.680638)
Focus past	1.086464 ***	.791373 **	.9389186 ***
	(.3037552)	(.3459772)	(.2407484)
Constant	22.9576 ***	32.75123 ***	27.85441***
	(3.949882)	(4.498916)	(3.130573)
Observations	40	40	80
Adjusted R-squared	0.6692	0.4223	0.5177

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 13: Pooled OLS regression predicting average salary offers to potential leaders.

We can see from regression results that determinants of average salary offers are almost similar across time spans. Only word count, article, affect and differ variables do not consistently affect dependent variable across experimental phases. All independent variables are tested for multicollinearity problem using the rule of thumb of no correlation exceeding 0.70. An F-test is also conducted on the regression model for all periods (1-30) to test its overall significance. Since F-statistic is equal to 6.65 and p-value is smaller than 0.0001, we are able to conclude that the model's coefficients are jointly different from zero.

In the first phase, word count, articles (e.g., a, an, the), male (e.g., guys, men, man), discrepancy, affiliation, differentiation, risk, focus on past dimensions are positively correlated with average offers to leaders while impersonal pronoun, interrogative, affect, anxiety, social, cognitive process, and reward dimensions negatively relate to offers to leaders. In the second phase, impersonal pronoun, interrogative, anxiety, social, cognitive process, and reward negatively correlated with average salary offers while male, discrepancy, affiliation, differentiation, risk and focus on past positively relate to average salary offers. Overall, throughout both phases, average salary offers to leaders are positively determined by word count, articles, male, discrepancy, affiliation, differentiation, risk and focus on past and are negatively driven by impersonal pronoun, interrogative, anxiety, social, cognitive process, and reward. It is noted that the unit of *word count* variable is the total number of words written in the text while the unit of other explanatory variable is expressed as percentage of *word count*.

Word count provides an indication for leaders' good communication ability, which is an essential skill of leadership and has been proved to help recover and improve groups' performances in public good game (Hamman et al. 2011; Brandts, Root, and Sola, 2015). There is little literature investigating the interaction between *male* words and leadership. As we look into text abstracts of leaders in treatments *LP*, *LCC*, *LIC*, and *LCCH*, we explore that the use of male words is mainly to substitute for 'person', 'people', and 'everyone'. In addition, male is a subcategory of social words, so we hypothesise that the use of male words establishes connection between leaders and group members during voting stage. Distribution of words count for leaders' abstracts is provided in *Appendix 9*.

Article has been demonstrated by Bono and Ilies (2006) to be frequently used by leaders in their expressions. Examples of affiliation word category include 'ally' and 'friend'. According to Conte and Plutchik (1981) and Brown (1965), *affiliation* is one of fundamental foundations of interpersonal characteristics and social behaviour, respectively. Moreover, House, Spangler and Woycke (1990) highlight that affiliation helps leaders enhance as well as maintain close contact with followers.

In previous version of LWIC2015, which is LIWC2007, *differ*, or *differentiation* is known as exclusive category (Pennebaker et al., 2015). Newman et al. (2003) highlight the use of exclusive words signals the honesty or truth-telling of the communicator. Slatcher et al. (2006) find the same results when examining speeches of US presidential candidates. Authenticity is a critical quality of leadership candidates as it helps earn trusts and commitments from voters. Hence, our result on the nexus between

differentiation word category and preferences over potential leaders is supported. Regarding *risk-related* words, Windsor et al. (2018) state that remained leaders discuss less about risks since they might evoke negative sentiments in followers and increase their dissatisfaction. We, however, argue that risks do not always suggest negative scenarios and can indicate the risk-aversion of abstract composers. In current literature, Ertac and Gurdal (2012) imply that individuals, whether or not selected as groups' decision makers, tend to take on less risk when making decisions on behalf of their groups. We, therefore, conjecture that participants, in our experiments, prefer risk-averse leaders who are more responsible for their money and common good.

Discrepancy, according to LIWC2015, includes words like *'should', 'would', and 'could'.* Pennebaker et al. (2003) highlight that people, who are dictated as having high need for achievement on TAT (Thematic Apperception Test) measure (Morgan and Murray, 1935), have an orientation to using discrepancy words more frequently. Furthermore, it is worth noting that 'should', 'would', and 'could' are also auxiliary verbs indicating obligations or desirability (Lillian, 2008). In this research, as we analyse written abstracts by potential leaders, we notice that the use of discrepancy words is to express leaders' desirability to be voted for as well as to make non-binding promises to group members to exert efforts to leading groups to success. Hence, our result on the positive relationship between discrepancy words and average salary offers stands solidly. In terms of *focus on past*, Pennebaker et al. (2003) also show individuals with high need for achievement measured by TAT measure, besides employing more discrepancy words, also use more past tense verbs, most of which are to describe past experience or historical backgrounds. Thus, group members are hypothesised to be impressed by leaders with successful records and have more preferences over such leadership candidates.

Although there is a number studies on the deployment of pronouns and their relationship with leadership (Bono and Ilies, 2006; Weiss et al., 2018), there is little evidence on the link between impersonal pronouns – a subcategory of pronouns - and the ability to lead. Qiu et al. (2012) is among a few studies that closely investigate the deployment of impersonal pronouns in text writing and related psychological process. They find that extravert and sociable individuals employ less impersonal pronouns in writing or speaking. In other words, frequent use of impersonal pronoun signals an introvert and less sociable person. This supports our findings as we explore that both social words and impersonal pronouns are both negatively related to the salary offers to leaders. It is hypothesised that group members are keen on sociable leaders.

While there is substantial evidence on the positive impact of *rewards* on employees' behaviour and job outcomes, Howell et al. (1990) point out that rewards for employees are one of the reasons for ineffective leadership as they weaken managers' attempts to manage their subordinates. In educational studies, Wehe et al. (2015) find that rewards have negative impact on one's intrinsic motivation. We, hence, have grounds to believe that our finding on the negative relationship between rewarding language and average salary offers to leaders and, hence, leadership is valid. Examples of *anxiety* words include 'worried' or 'nervous' (Pennebaker and Taucszik, 2010). According to Windsor et al. (2018) retained leaders, as compared to removed

leaders, employ more optimistic languages with a view to creating positive feelings in followers. Anxiety terms are, therefore, negatively correlated with preferences over potential leaders in our experiments. Regarding *interrogative* language used by leaders, Enache and Zografi (2007) and Schnurr and Mak (2011) show the employment of interrogative words reveal the hesitation and indecisiveness of the speaker or writer, which can make a leader less appealing to her followers or subordinates.

Social word category covers a wide range of subcategories such as friend, family, male, female, and so on. It also has strong relations to other word categories like positive emotions or affective words. As can be seen from regression table, social words are found to adversely relate to average salary offers to leaders while male words move positively with leaders' offered salaries. It is found that the need for affiliation, which positively correlate with average salary offers, decrease the use of social words (Pennebaker, Mehl and Niederhoffer, 2003). Hence our finding regarding social words are solidly supported.

Last but not least, cognitive process has been long studied in psychology, management and, economics as an important factor of effective leadership. While there is a majority of scientists support cognitive abilities as critical qualities of good leaders, Kellett, Humphrey, and Sleeth (2006) and Mueller, Goncalo, and Kamdar (2011) cast doubt on the vitality of cognitive abilities. While Kellett, Humphrey, and Sleeth (2006) demonstrate there is no correlation between cognitive abilities and relations leadership, Mueller, Goncalo, and Kamdar (2011) find the negative relationship between individuals, who express creative ideas, and leadership potentials. In the current study, as cognitive process has negative impact on preference over leadership, we believe that group members pay less attention to potential leaders' cognitive ability during voting stage.

Based on what have been discussed, we conclude that leaders, who are able to show their good communication, needs for achievement and affiliation, risk aversion as well as authenticity in their introductory paragraphs, receive higher offers from group members.

Result 2: *Leaders, who manage to show their communication skill, need for achievement and affiliation, aversion to risk and authenticity in their abstracts, receive higher offers from group members in the voting stage.*

3. Magnitude of effect of individual communication and common communication

Hypothesis 3: *Individual communication is more effective in increasing group efforts in comparison to common communication.*

Our hypothesis 1 states that leaders with communication roles receive higher offers than passive leaders as they are expected to perform an important task of uniting group members and encouraging them to contribute more to the public through messages. To provide a deeper insight into the significance of communicating

leaders, in the current hypothesis, we investigate if individual communication is more effective than common communication by applying Mann-Whitney test. So as to conduct this non-parametric test, we firstly need to calculate the average contributions of each group in *LCC* and *LIC*. The average values are calculated by taking the average of all contributions of each group throughout the first phase, the second phase, and then both phases. Next, we apply the Mann-Whitney (U-test) on calculated numbers and compare generated p-values with chosen significance level to determine if there is evidence on the difference in performances between groups led by leaders, who send individual messages, and groups led by leaders, who send common messages. In the table below, we present results from the U-test in three different time spans as well as relevant statistics for each studied treatment.

	Observations	**Phases**		
		Periods 1-15	**Periods 16-30**	**Periods 1-30**
Average group contribution (Treatment *LCC*)	6	8.128494 (2.400275)	9.900556 (4.60221)	9.014525 (3.321854)
Average group contribution (Treatment *LIC*)	6	9.906318 (2.673488)	11.79414 (3.850581)	10.85023 (3.000396)
p-value		0.2623	0.3367	0.3367

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 14: Comparison on average performances (in ECUs) between groups in treatments *LCC* and *LIC*.

As can be seen from the table above, in the first experimental phase, based on the p-value (*p-value = 0.2623*), we can conclude that there is no statistical evidence on the difference in average performances between groups in *LCC* and those in *LIC* although groups in *LIC*, where leaders send individual messages, make higher contributions, on average, to the public good (μ = 9.91 ECUs) than groups in *LCC* do (μ = 8.13 ECUs), where leaders send common messages. In the second phase, we also cannot reject the null hypothesis that average performances of groups in *LCC* and those in *LIC* are equal (*p-value = 0.3367*). However, similar to phase 1, the average group contribution in *LIC* (μ = 11.79 ECUs) is found to be larger than that in *LCC* (μ = 9.90 ECUs).

We also provide graphical comparison on average contribution between *LCC* and *LIC* across phases in the figure below. It is noted that, for each treatment, the average value on contribution level in each period is calculated as the average of all six independent groups' contributions in that period. We can see that there is no end-game effect in *LCC* and *LIC* in any phase. This can be because participants are not informed about the length of experiments in advance. In terms of restart effect, we

observe that there is significant difference in average contribution between period 1 and period 16 of both treatments indicating that there is no restart effect.

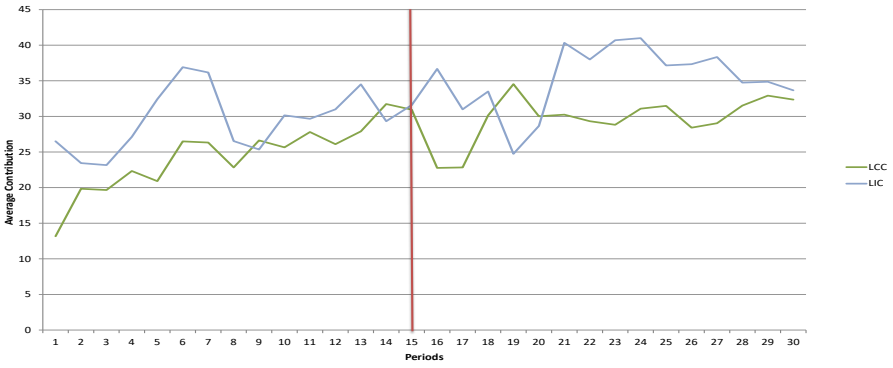


Figure 5: Average Contributions of *LCC* and *LIC.*

Overall, throughout 30 periods, the average contributions of groups in treatments *LCC* and *LIC* are statistically indifferent (*p-value = 0.3367*) although the average contribution of *LIC*'s groups (μ = 10.85 ECUs) is higher than that of *LCC*'s groups (μ = 9.01 ECUs).

In health research, Latimer, Brawley and Bassett (2010) show that tailored messages, which are composed to at least one characteristics of recipient, have more influence on motivating individuals to adhere to frequent physical activities. In this study, however, individual messages are not significantly different from common messages in terms on of elevating total contributions to the public good. One possible explanation for this finding is leaders, who are supposed to perform individual communication, compose duplicate messages and send them to followers in multiple periods. This, as a consequent, reduces the effectiveness of leaders in *LIC* as compared to those in *LCC*. The table below reports the number of periods that *LIC*'s leaders send duplicate messages to their followers:

Leaders/Groups	**1**	**2**	**3**	**4**	**5**	**6**
Number of periods sending duplicate messages	14	6	21	25	23	20

Table 15: The number of periods leaders in treatment *LIC* send duplicate messages.

As can be seen from the table above, all group leaders in *LIC* send duplicate messages for at least 6 periods throughout the experiment. Leader of group is recorded to employ duplicate messages the most frequently among leaders in *LIC* while leader 2 employs the least duplicate messages. On average, the number of periods that *LIC*'s leaders send out similar messages to followers is 18.17, which is more than half of the total experimental periods.

Result 3: *There is no difference in collective performances between groups with leaders sending common messages and groups with leaders sending individual messages.*

4. Messages and group's performance

Hypothesis 4: *The quality of messages matters to the groups. Selected leaders, who send more incentive, cooperative, and affectionate messages, elevate groups' overall performances far better than other selected ones.*

In communication treatments, leaders play an important role in incentivising their followers to increase contributions to the public good through messages. Communication has been found to be an effective and strong method to recover and maintain cooperation in organisational structure (Brandts, Root and Sola, 2015). Oprea, Charness and Friedman (2014) and Levy et al. (2011) also obtain similar results. In treatments *LCC* and *LCCH*, each leader is responsible for sending a common message to all three members at the end of each period while in *LIC* they are asked to send three different messages to each follower. We want to investigate the influence of leaders' messages on groups' performances as well as compare the magnitude of this impact between common and individual messages.

We run two different regressions in this hypothesis with the first one between groups' performances and leaders' common messages of treatments *LCC* and *LCCH* and the second one between groups' performances and leaders' individual messages of *LIC*. We firstly report the regression results of each pooled OLS regression model and discuss our findings for each regression. Then, we compare the differences in text messages between treatments *LCC*, *LCCH* and treatment *LIC*. For each regression, we display our findings for the first phase and the second phase as well as both phases.

Before discussing regression results for treatments *LCC* and *LCCH*, it is noticed that an F-test is conducted on the model for both phases (1-30) to check if its regression coefficients are different from zero. Since the F- statistic is 8.81 and the p-value is smaller than 0.0001, we are able to reject the null hypothesis that the model's coefficients are jointly equal to zero.

As can be seen from *Table 16*, in the first phase, leaders in treatments *LCC* and *LCCH* send authentic and friendly messages to group members. They also regularly employ word of collectivism, which is 'we'. In addition, articles and adjective are found to be positively correlated with groups' performances. Both of these two word categories have been proved by Bono and Ilies (2006) to be preferably used leaders. However, leaders in these two treatments are also found to use less leisure-related and quantitative words. The number of words per sentence written by these leaders is also adversely related to their groups' performances. In addition, we find a significant positive correlation between *LCC*Periods*, which is a dummy variable showing the interaction between time variable – *Periods* – and treatment effect of *LCC*, and average contribution level indicating that performances of groups in *LCC* increase throughout periods of phase 1.

Variables	Phases		
	Periods 1-15	Periods 16-30	Periods 1-30
Authentic	.0511154*	.0966713***	.0678806***
	(.0281324)	(.0274329)	(.0196389)
Word per sentence	-.3700742*	.2903476	-.2305641
	(.2006863)	(.4052453)	(.1917061)
We	.2998552*	.7926391***	.520567***
	(.165235)	(.1878934)	(.1254002)
Article	.5357681**	-.0011981	.3757324**
	(.205405)	(.3232247)	(.1826372)
Adjective	.155354**	.2446302***	.2471553***
	(.0753224)	(.0693257)	(.051278)
Quantitative	-.1916739*	-.2901407**	-.263313***
	(.1113825)	(.1191322)	(.0828184)
Friend	.7373541***	-.3871332	.4284188***
	(.1438105)	(.2594763)	(.1256366)
Insight	-.1909683	-2.767074***	-.4380118
	(.260589)	(.8200518)	(.2690827)
Power	-.242903	-.3251117***	-.268577***
	(.1947267)	(.1153461)	(.0961727)
Leisure	-1.027062**	-1.973204***	-1.391255***
	(.4031401)	(.6261575)	(.352839)
LCC*Periods	.4247608*	.2036781	.2008606**
	(.2241757)	(.2529969)	(.09938)
LCCH*Periods	.3524516	.1722567	.1946745**
	(.2224942)	(.2467475)	(.0940932)
Constant	22.11105***	21.53645***	22.82733***
	(2.575585)	(6.321344)	(2.15334)
Observations	180	180	360
Adjusted R-squared	0.2682	0.2366	0.2070

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 16: Pooled OLS regression predicting groups' performances in treatments *LCC* and *LCCH*.

In the second phase, pattern of leaders' common messages does not have many changes although there are some new factors. Impacts of authenticity, friendliness and collectivism on groups' performances are still well rooted in leaders' messages. Word categories of quantitative and leisure remain adversely related to groups' performances while significance of article words weakens. Especially, it is recorded that there are two new drivers of groups' performances, which are insight and power-related words. Both of them are found to negatively correlate with group

performances. We conjecture that leaders, in the second phase, still want to create a supportive and collaborative atmosphere in their groups by using friendly and collectivist words to incentivise followers and encourage them to give more to the common good. They, therefore, also want to avoid powerful or power-related words to impose pressure or tension on teamwork. The interaction terms between treatment effect of *LCC* and *LCCH* and *Periods* variable, nevertheless, are found to have no impact on average performances in phase 2.

Overall, it is found that leaders' messages in common communication treatments are featured by friendliness, authenticity and collectivism. They are also driven by positively driven by articles and adjective and negatively determined by quantitative, power-related and leisure-related words. Besides, we manage to record that average contributions of groups in *LCC* and *LCCH* have a consistent tendency to rise over 30 periods of the experiments.

Variables	**Phases**		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
They	4.550082* (2.497387)	---	3.291907 (2.868585)
Number	.6129285*** (.1696909)	.1483614 (.1764857)	.3375852*** (.1266138)
Compare	-.1904129 (.1459038)	-.5530989** (.2327573)	-.3650743*** (.13337)
Positive emotion	.2180967*** (.0611074)	.0156753 (.0691739)	.1045441** (.0480822)
Friend	3.057244** (1.348264)	.1860639 (2.089594)	2.388224* (1.240943)
Discrepancy	---	.8793375 (.5331166)	-.0506342 (.2642264)
Affiliation	.3451489* (.1892488)	.2162723* (.1255358)	.2612124* (.1390526)
Work	.3408176* (.2004774)	.8207384* (.466925)	.3823007* (.2022885)
Constant	23.04505*** (2.65529)	33.36917*** (2.789312)	29.86455*** (2.153126)
Observations	90	90	180
Adjusted R-squared	0.2780	0.0793	0.1445

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 17: Pooled OLS regression predicting groups' performances in treatment *LIC*.

Before discussing regression results for *LIC*, we want to notice that an F-test is conducted on regression coefficients of model for all periods (1-30) to check if they are

jointly different from zero. Since the found F-statistic is 3.75 and p-value is smaller than 0.0001, we can confirm the overall significance of our prediction model.

As can be seen from *Table 17*, in the first phase, leaders in *LIC* send friendly and cooperative messages as they employ affiliated and friendly words. They also use more positively emotional words to communicate with their followers. Another significant feature is that *LIC*'s leader, in the first phase, significantly discuss about work-related matters. We conjecture that leaders, besides creating a friendly and cooperative spirit within their groups, they also want to emphasise on the group's task so that everyone focuses more on achieving the common goals. We also find that *LIC*'s leaders, in the first phase, employ more third-person pronouns 'they' and numeric words in their individual messages. Pennebaker, Mehl and Niederhoffer (2003) highlight that rich employment of second and third-person pronouns suggest that the message senders are socially engaged or aware. They also state that highly self-monitoring individuals, who are found to be highly ranked on leadership ability (Zaccaro et al., 1991), deploy third-person pronouns frequently.

In the second phase of *LIC*, there are some changes in pattern of leaders' messages to group members. It can be seen from table above that, groups' performances are only determined by three factors, which are compare, affiliation, and work-related words. While compare is found to be negatively correlated with groups' performances, affiliation and work-related words are still positively related to groups' contributions as they are in the first 15 periods. Leaders are still able to maintain collaborative spirit in their individual messages as well as discuss about group task with their members. However, the friendliness and positive emotion, which are significant in the first 15 periods, weaken in the second phase and so do third-person pronoun of 'they'. Numbers are also insignificant in the second phase.

In general, for treatment *LIC*, leaders' messages are featured by friendliness, affiliation, work and positive emotion. They also have more numbers and less comparative words.

We now can compare the patterns of messages in common and individual communication treatments. It can be seen that the biggest similarity between these two categories of treatments is that leaders tend to send cooperative and friendly messages with a view to strengthening the collaboration between group members. Also, they are found to employ positive words frequently when communicating with followers. For *LIC*, it is clear to assert that leaders employ positive emotion words in their languages as there is a significant positive relationship between this word category and collective performances. For treatments *LCC* and *LCCH*, however, we need to closely examine the content of leaders' common messages to realise that a third of adjectives used by leaders are positive emotion words. Beside similarities, there are several differences between common and individual communication. The first difference to be mentioned is the authenticity, which is deeply rooted in common communication. Leaders of treatments *LCC* and *LCCH* show they are authentic and sincere in their use of language. We conjecture that, first of all, messages sent by leaders in these treatments are commonly viewed by followers. Leaders, hence, use more collective words, especially first-person plural pronouns 'we', to refer to all team

members and get everyone involved and engaged in teamwork. Secondly, leaders have a strong incentive to maintain their self-images of being good leaders and, hence, avoid employing negative words to criticise or express anger over low contributors. Instead, they use more evaluative words (e.g. adjectives) to raise followers' awareness of groups' performances and encouraging phrases to compliment generous contributors as well as propagate collaboration among individuals. Otherwise, group leaders might create conflicts with members and decrease cooperation between them and teammates. According to Newman et al. (2003), authenticity of language use is characterised by three qualities, two of which are increased employment of first-person pronouns and more use of evaluations and judgments.

On the other hand, leaders in *LIC* dominantly use more numbers and work-related words while communicating with followers. It is hypothesised that messages sent by these leaders are tailored-made and address different issues of different members, so they contain more numbers to discuss about the amounts of contribution group members have made in the public good game and whether these amounts are acceptable and what are the suggestions on the contribution for the next period. Also, unlike treatments *LCC* and *LCCH* where messages are commonly viewed, messages in *LIC* are discretely viewed and, hence, leaders have more chance to discuss in detail with each member about group tasks resulting in higher frequencies of work-related words.

Result 4a: *In common communication, groups with leaders, whose messages are friendlier, authentic, collectivistic and less power-oriented, have better performances than other groups.*

Result 4b: *In individual communication, groups with leaders, whose messages are featured by friendliness, affiliation, positive emotion and an orientation for work, outperform other groups.*

5. Abstract content and leader's reselection

Hypothesis 5: *Leadership candidates writing more cooperative, risk-averse and authentic abstracts are selected as leaders.*

In hypothesis 2, we explore the bond between leaders' abstracts and their received offers. However, as we present in our experimental design, selected leaders may be ones who are not offered with highest salary offers. This is because, after observing all offers from all groups, leadership candidates are provided with time to select which groups to lead and leaders, who are faster and more willing to step forwards as leaders, can pick a group to lead while others have to temporarily stop the experiment. We, therefore, want to investigate what selected leaders actually write in their abstracts. In order to achieve this goal, we firstly need to identify the number of times each leadership candidate is chosen as leader in both phases. Then we regress them on word categories from leaders' abstracts, especially those specified in hypothesis 2 of this chapter. It is noticed that we employ Poisson model to run

regressions for the current hypothesis. The number of times a potential leader selected as real leader is can be 0, 1 or 2 and hence we apply Poisson model with robust standard error.

	The number of times selected as leaders
Authentic	.0044769**
	(.0021865)
Verb	-.0225681**
	(.0094918)
Affect	-.0168717***
	(.0054981)
Number	-.0109568***
	(.0029508)
Insight	-.0690743***
	(.0180587)
Tentative	.102879***
	(.0290971)
Social	-.0229653***
	(.0072191)
Risk	.0965892**
	(.0374623)
Power	.0056217
	(.0120304)
Reward	-.0508519***
	(.0168866)
Time	-.0445365***
	(.0113365)
Focus future	.0490434***
	(.0187513)
Work	.0112768
	(.012004)
Money	-.1336046***
	(.0425023)
Constant	1.079221***
	(.2851633)
Observations	40
Chi-squared test (p-value)	0.00***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, robust standard errors in parentheses.

Table 18: Poisson regression predicting the number of times selected as leaders.

A Chi-square test is conducted on the above Poisson model to check if its regression coefficients are overall significant. Since the Wald chi-squared statistic for is 80.18 (p-value < 0.0001), we can conclude that there is at least one coefficient in the above model is different from zero. The Wald chi-squared statistic tells us whether our model has the goodness-of-fit and it, thus, plays a similar role to that of F-statistic in pool OLS regression. Throughout all chapters, unless the otherwise is notified, the chosen significance level of Chi-squared test is 10% or 0.1.

As can be seen from table above, our prediction is supported as candidates, who write more affiliated, risk-related and authentic abstracts, are more likely to be selected as leaders. Other variables such as social and affect categories have negative correlations with the number of times leaders selected and these are similar to the current chapter's hypothesis 2. Besides, insight category, which is a sub-category of cognitive process, is also adversely related to the likelihood of being selected as leaders.

Focus on future and money-related word categories critically help distinguish the abstracts of selected leaders from potential leaders' ones. Herein, we find that leadership candidates, who mention less about money and are more visionary, tend to be frequently chosen as leaders. These results strengthen existing literature in leadership and psychology where leaders are supposed to be forward-looking (Daft, 2008) and less money-referenced (Slatcher et al., 2007).

Besides, we also find that tentative word category positively relates to the frequency of being selected as leaders. We conjecture that the use of tentative words by selected leaders is because they are more ambiguity seeking and fully aware of uncertainties that they and their followers may have to deal with. In addition, frequently selected leaders are also found to use less time, numbers and verbs in their abstracts than non-selected or less frequently selected leaders.

Based on what have been analysed and discussed, we conclude that besides affiliation, risk-aversion and authenticity, being visionary and using less references to money are well rooted in selected leaders' introductory paragraphs while tentativeness requires further analysis before we can state whether this indicates selected leaders' ambiguity seeking characteristics. Hypothesis 2 in chapter 4, which examine the traits of efficient leaders, can help address this question.

Result 5: *Leaders, whose abstracts are more authentic, risk-related, visionary but less money-referenced, are more likely to be re-elected by group members.*

V. Summary and Conclusion

Our study mainly looks into the importance of leader's communication to group's performance and how it affects the possibility a leader is re-elected. Also, we investigate the how abstracts written by leaders determine their salaries and if there is any difference in the salary offering amounts between communicating leaders and passive leaders. Last but not least, in health studies, there is substantial evidence on

the positive effect of individual messages on patients' behavioural adjustment. However, this aspect has not been well studied in experimental researches on leadership. Hence, we want to shed light on the effectiveness of common and individual communication employed by leaders and how they affect collective performances. As discussed in the literature, Hamman et al. (2011), Levy et al. (2011), and Brandts, Root and Sola (2015) find that communication helps increase cooperation and contribution to the public good. However, in all of these studies, common communication, where each leader composes one single free-form message in each experimental period, is employed and not the individual communication. Therefore, it raises a critical question on whether, between different types of communication, they all result in the same results or they affect cooperation among group members distinctively. To answer this question, in our treatment designs, we allow leaders to send common messages in two treatments of *LCC* and *LCCH* and to send separate messages in *LIC*. We then deploy LIWC2015 to analyse these text messages of the three treatments and make statistical comparisons between them to achieve our research aims.

Our findings can be summarised as the following. Firstly, we find that, between passive and communicating leaders, those with communication roles statistically receive higher offers from group members during the voting stage. Secondly, we find that leaders, whose abstracts display more authenticity, need for achievement and affiliation, risk aversion and good communication ability, are offered with higher salaries by the group members. Thirdly, unlike what is revealed by health studies, we do not find significant difference in performances between groups led by leaders sending common messages and those led by leaders sending individual messages. As aforementioned, this result could be due to the fact that leaders, in individual communication treatment, duplicate their messages and send to group members leading to a decrease in the effectiveness of individual communication as compared to common communication. Fourthly, we manage to analyse messages sent by leaders in treatments *LCC*, *LIC*, and *LCCH* and correlate them with groups' performances to study how these texts influence collective outcomes. It is found that leaders in both common and individual communication treatments tend to send friendly and cooperative messages to group members during the experiments. However, they also differ from each other in several aspects. While pattern of messages in common communication is featured by authenticity and frequent use of articles and adjectives, which are found to be preferably used by leaders (Bono and Ilies, 2006), pattern of messages written by *LIC*'s leaders is more work-related and numeric. In addition, leaders in treatments *LCC* and *LCCH* use less powerful words in their communication while leaders of *LIC* use less comparative words. Fifthly, we realise that leaders, who write more authentic, visionary but less money-referenced abstracts, stand a better chance of being re-elected when the game restarts. We also find that these leaders prefer using more tentative and risk-related words and employing fewer verbs, number and rewarding words. Their abstracts are also less social and affective.

Herein, we also want to provide some implications, first of all, to human resource management. One of our findings recommends that group members prefer

leaders who are able to show authenticity, need for achievement and affiliation, risk aversion in their communication. If, for example, a company is screening for candidates for upper level management, HR department and CEO can limit the list of potential candidates by using the above characteristics as those with such traits are likely to interact and cooperate well with employees after recruitment. Moreover, if members of staff are able to work with their preferred leaders, they will be happier and become more productive. This causal relationship has been highlighted in Foels et al. (2000). Related papers also include Roberts, Miles and Blankenship (1968) who demonstrate the relationship between employees' preferences for leadership styles and their job satisfaction. To extend this argument, we refer to Barsade (2002), Oswald et al. (2015) and Fisher (2010) as they have shown the positive effect of subordinates' satisfaction on organisational success including increased cooperation, higher productivity and greater customer satisfaction.

Second of all, our study provides implication for organisational behaviour, applied communication and leadership. How to improve efficiency of teamwork through verbal interaction between leaders and members has become one of the longest-standing questions for scientists in organisational studies. While there are various researches conducted to answer this query, there has not been a complete consensus among researchers. Results from our study are expected to enhance effectiveness of communication between leaders and members as well as provide further insight into the connection between groups' performances and leaders' speeches. Depending on types of communication that leaders are using, they can refer to our findings on either common or individual messages. In general, friendliness and affiliation are two most important qualities of any message, whether common or individual, sent or spoken by leaders. Without these two qualities, it is unlikely that leaders can captivate employees' attention and achieve highest effectiveness in their communication. In specific, if leaders are speaking to a group of members (common communication), they can use more 'we' in their messages to get every member involved and more engaged in teamwork. This also raises cooperative spirit among followers and, in turn, elevates collective productivity. It is as well important to note that using less power-related words in common communication is recommended as a too powerful leader may suppress other group members and prevent them from contributing ideas to group's decisions. This is in line with Fodor and Smith (1982). On the other hand, if leaders are talking to a member of staff individually (individual communication), they can employ more work-related and numeric words to specify an issue or a task that member is working on. Positive emotion words can also help improve the efficiency of one-on-one communication as it reduces tension and conflict between leader and a particular follower if there is any.

Thirdly, surviving in the next election has become a target of political party leaders around the world. In order to this, party leaders need to retain the support of the current masses. They even have to increase the number of supporters prior to the next election if they want their parties' winning chances to be reassured. Public meetings are where party leaders meet and propagate their parties' visions and strategies. This is considered as good chances for them to attract public's attention and

raise people's awareness of their parties. Our study suggests that leaders, who are more visionary, authentic and risk-averse, stand a bigger chance for being re-elected. Our research, therefore, can be of interest of politicians and politics scientists. Besides, scholars in personality research area may find our study useful as they have a long history of analysing and studying languages used by political leaders, president candidates and prime ministerial candidates as well. One of the most typical papers in this field that learns about words used by US presidential and vice-presidential candidates is by Slatcher et al. (2007). In this research, authors have employed LIWC software to decompose recorded speeches of candidates for presidency and vice presidency in the US and correlate word categories generated from the software with linguistic measures such cognitive complexity, femininity, depression and so on.

There are several limitations in our studies and we expect future researches can overcome those so as to produce additional understanding about the impacts of leaders on organisational success and how their communication helps recover and maintain success of organisations over time. The first limitation of our experimental design for communication treatments is that we could not control leaders' sending duplicate messages in individual communication treatment and this have reduced the dominant effect of individual messages over common messages. We expect future designs to refrain group leaders from sending the same messages to all followers in individual communication treatment. Also, since there are still more aspects of leader's communication and its effects on collective performances that have not been studied and discussed in this research, we want future studies to construct more treatments based on our designs to provide more insights into this interesting and highly applicable research area.

Lastly, our experimental design is built around communication role of leaders. However, it does not mean that other interventions such as monetary benefits, punishments or allocation authority are not effective in elevating collective productivity. Instead, there exist studies having already looked into these interventions performed by group leaders. We, therefore, expect to see in future researches a combination between leader's communication and one of the above interventions or all of the above interventions to investigate how they together influence the outcomes of public good game. We believe these combinations can provide deeper knowledge about interaction between interventions that leaders can use to enhance collective productivity and give more advices to organisations for improving their employees' efficiency, commitment and abilities.

Chapter 3: Line management: Employees' happiness and feedback system

I. Introduction

Line managers are depicted as the middle men between upper management and workers or employees in companies (Kerr, Hill and Broedling, 1986). Their roles spread from planning and scheduling operations to selecting and training employees. In the past, the importance of line managers was undeniable and critical for corporate success. However, it has been eroding over time owing to technological advancement and incredible growth of specialised services departments within organisations (Kerr, Hill and Broedling, 1986; Orpen, 1994). Besides, the fact that line managers do not receive sufficient support from higher managers even exacerbates the poor condition of those middle men.

Orpen (1994) recommend that in order to recover significance of line mangers or supervisors, organisations firstly need to help them strengthen their positions. This means companies should provide more management training programs for line managers with a view to enabling them to enhance productivity of their supervisory tasks. Keeping line managers well updated on technology is another way firms can take to tackle the deteriorating importance of line managers. Technology is the key to success in nowadays businesses and, therefore, whoever masters technology is the winner.

Also, organisations have to provide first-level managers with extra tools and levers of authority so that they can regain influence on subordinates. For example, companies can give line managers the power to hire and fire employees in specific situations or assign duties to allocate tasks and adjust working conditions. Moreover, Kerr, Hill and Broedling (1986) suggest that supervisors can extend their impacts on subordinates by elaborating on their own leadership ability. Plus, Orpen (1994) asserts that the way supervisors treat their staffs affects others' perception of those supervisors' influence.

How to improve job outcome is a long-standing question in organisational and managerial studies. Patterson et al. (2005) and Riedel, Nebeker, and Cooper (1998) suggest that organisations should clearly define job objectives if they want to heighten employees' commitment and, therefore, the overall performance. In another paper, Blegen (1993) meta-analyses 48 researches on nursing and finds that job outcome can be efficiently improved if supervisors communicate more with their staffs or provide recognition for excellent employees. There is one more important factor that strongly correlates with organisational success, which is employees' happiness or satisfaction with leaders. Unfortunately, this has not been closely studied and is requiring more investigation from scientists.

Leader's positive mood is found to have strong influence on subordinates' productivity (Barsade, 2002). Employees, who work for a happy leader, are recorded to have better task performances and exhibit firm commitment to work. This is because

positive feeling has contagious effect and can be spread from one to another. If leader is happy, s/he can transmit that positive energy to her subordinates and make them feel happy as well (Barsade, 2002). As a consequence, job outcome is significantly enhanced as happy individuals work more efficiently and productively than less happy ones (Oswald et al., 2015). In existing literature, nevertheless, there is little understanding about the inverse impact, which dictates that employees' feeling affects leader's effort as well as behaviour. In addition, there is a lack of emphasis on methods that employees can deploy to express their opinions on leader's performance.

Feedback is not only important for employees to improve their future tasks, but it is also important for leader as well. Without having feedback, leader is hard to assess her performance as well as satisfaction of employees. In many cases, this leads to deteriorating leadership and even tyranny, in which leader exploits employees for the benefit of own (Hamman et al., 2011; Keller, 1999). Despite its importance, feedback system has received disproportionate attention from scientists in leadership and organisational behaviour. In the current study, we propose a simple, but effective, method to evaluate leader. At the end of each experimental period, group members are asked to rate their happiness with the leader. Average happiness level of all group members will be then shown to the leader. Especially, at the end of period 15 and 30, group members can vote to keep or remove their leader as well.

Leadership removal discloses how well a leader has done in terms of sustaining cooperation between group members and improving collective welfare. It is, hence, also an evaluative indication of how much followers are happy with the power holder. In politics, Mesquita and Smith (2010) and Flores and Smith (2011) has closely investigate impacts of leadership removal on provision of public goods as well as electoral campaigns. Unfortunately, it has been downplayed in the field of experimental economics and there is little experimental having looked into this vibrant aspect of selectorate politics. In the current documentation, we want to fill this research gap and shed light on the behavioural decision to sack the head of an organisation.

Beside employees' satisfaction with the leader and feedback system in an organisation, we also want to explore the link between leader's communication and happiness of employees and, hence, the communal productivity in this chapter. As aforementioned, communication plays a vital role in enhancing job outcome (Blegen, 1993) and influences changes in organisational structure (Brandts and Cooper, 2007; Oprea et al., 2014; Brandts, Cooper and Weber, 2015; Brandts, Root and Sola, 2016; Chaudhuri and Paichayontvijit, 2010; Levy et al., 2011; Hamman, Weber and Woon, 2011; Nguyen and Chmura, 2020). There is a vast experimental literature that amplifies the impact of verbal interaction on group performance (Levy et al., 2011; Chmura and Phuong, 2020). Herein, we want to make one step further in understanding the relationship between leader's use of language and subordinates' mood. Such link will provide valuable hints to human resource department in terms of improving the interaction among staffs within companies as well as training leadership skills for line managers in corporations. Linguistic Inquiry Word Count 2015 (LIWC2015) is employed to analyse all group leaders' messages and abstracts in this chapter. The software has

been developed by Pennebaker et al. (2015) and widely used for both academic and industrial purposes.

Allocation authority is employed in our studies because it is one of the most critical components of leadership (Drouvelis et al., 2017; Stoddard et al., 2014; Abeler et al., 2010; Heijden et al., 2009; Yukl, 1989; French and Raven, 1959). In path-goal and operant condition approaches to leadership, the ability to make contingent output distribution in light of group members' performances plays a detrimental role to leaders' success in incentivising followers (Jago, 1982; Zhu et al., 2012; Nguyen and Chmura, 2020). Heijden et al. (2009), Drouvelis, Nosenzo, and Sefton (2017), and Abeler, Altmann, Kube, and Wibral (2010) prove that allocation authority improves groups' performances and reduce free-riding problem. In contrast to revenue-sharing treatment, a leader is usually randomly selected or voted to be responsible for distributing the final output of public good game to team members in revenue-allocated treatment. It is reported that, in most of the cases, leaders tend to distribute more output to high contributors. However, there is a minority of leaders tend to keep most of the output for themselves regardless of contribution level of team members. Consequentially, performances of groups with selfish leaders deteriorate over time and plummet towards the end of the experiment. This leads to argument over the role of leadership in organisation and demand for further studies on leader's performance.

Mechanism for choosing leaders has certain effect on subordinates' conducts and, thus, common benefits. In existing literature, leaders can be either randomly appointed from a group of subjects or voted through an election. In both scenarios, groups with leaders are proved to be far more efficient than groups without leaders (Dannenberg, 2014; Levati, Sutter and Heijden, 2007; Hamman, Weber and Woon, 2011). Hamman et al. (2011) and Brandts, Weber and Cooper (2015), is one of the recent work that compare the effectiveness between appointed leaders and elected ones. They find that voted leadership is better than exogenous leadership in terms of incentivising group members to contribute to the public good. According to Hamman et al. (2011) and Brandts, Weber and Cooper (2015), elected leaders are more efficient because they obtain legitimacy from being selected via voting. Besides, they also criticise randomly selected leaders for not being democratic. Thus, in our experiments, we combine random selection process of power holders with salary offering mechanism to offset drawbacks of exogenous leaders and endorse leadership legitimacy. In specific, there would be five subjects randomly selected as leadership candidates before group members make salary offers to them. Potential leaders can decide which groups they are going to lead after observing all offers. It is noticed that prior to making offers for power holder candidates, group members have a chance to read written abstracts to gauge more knowledge of each leadership candidate. Those introductory paragraphs are similar resumes that job seekers submit to employers when they apply for vacancies. According to Arnulf, Tegner and Larssen (2010), resumes provide relatively enough reliable details about individuals so that recruiters can select suitable candidates efficiently and less time-wasting.

Public good game (Marwell and Ames; Fehr and Gächter, 2000) has deeply rooted in researches on social dilemmas and coordination issues. It is relevant to our

current study as public good game create an ideal environment for examining collaboration and selfishness within individuals. In the game's setting, there are four players in each group and they are endowed with initial wealth. As the game begins, each group member has to determine the amount they wish to donate to the public good. The sum of all contributions is then multiplied by a multiplier before being equally redistributed to all members. In the best scenario, if all group members are cooperative, they contribute all of their wealth, which results in maximum output, and social efficiency is said to be achieved. On the contrary, in the worst case, group members defect and retain all of their endowed funding resulting in zero output and social inefficiencies occurs. Leader-members setting is a variation of public good game in which scientists aim to see if the introduction of a leader to group context can enhance and maintain the maximised outcome over time as well as resolve free-riding phenomenon. Heijden et al. (2009) employ leader-members setting to investigate how groups with leaders responsible for allocating revenues to followers outperform groups with revenues equally shared among members. Levy et al. (2011) document the positive effects of leaders' communication on groups' performances. In a more recent work, Gächter and Renner (2018) use public good game to study leaders' role in shaping others' beliefs and facilitating the accomplishment of collective efficiency.

In the remaining parts of our research, we sequentially present literature, experimental design, data analysis and results before providing conclusions and suggestions for future studies. Our research is the first among of its kind to examine the causal link between employee's happiness and leader's behaviour and, hence, group overall outcome by deploying a leader removal survey at the end of each experimental phase. This study is also among the first attempts in experimental economics to investigate the linguistic dimension of leader's speech and how it triggers team members' reaction. Leaders, in the current research, are selected using mechanism proposed by Chmura and Phuong (2020), which offsets weaknesses of exogenous leadership as well as highlighting the legitimacy of elected leaders (Brandts, Cooper and Weber, 2015). Finally, we want to demonstrate the positive nexus between employees' happiness and leader's allocation of collective output. Although there has not been significant evidence in previous papers on this relationship, Heijden et al. (2009) and Drouvelis, Nosenzo and Sefton (2017) argues that if leaders utilise their allocation authority efficiently they are able to improve groups' performances and reduce free-riding problem. We, hence, present our research question as the following:

_ Is groups' happiness related leaders' allocation behaviour? Does feedback system enhance leaders' allocation efficiency?

_ Are groups with lower performances more likely to remove leaders at the end of each phase?

_ How does leaders' language affect group members' salary offers as well as their contribution behaviour?

_ Do salary offers signal group members' commitment to collective success?

II. Literature

We have insisted on the need for further understanding about staffs' happiness as well as how to measure it in the previous part of this study. However, it would be a shortcoming if we do not formally define what happiness in organisation entails and why it is critical for collective efficiency. According to Fisher (2010), the first and foremost central construct of happiness at work is job satisfaction. Newly-added and transient constructs of happiness at work that can be listed include monetary affect, monetary mood, intrinsic motivation, task enjoyment or level of engagement (Fisher, 2010). By affecting these constructs, employers can increase happiness or satisfaction of their employees at work. Morgeson and Humphrey (2006) contend that job characteristics, like working conditions, task complexity, social support and motivations, positively correlate with staffs' happiness and satisfaction at the workplace. In a field study, Proudfoot et al. (2009) develop a program for a company in financial services industry to help their sales agents release stress and realise that organisational care for staffs' well-being drives job satisfaction upwards.

Consequences of employees' happiness at work are well stated in Fisher (2010). On a daily basis, positive mood enhances job creativity, productivity and, particularly, reduce in-group conflicts. Similar reports are recorded in Erez and Isen (2002) and Ilies and Judge (2005). Moreover, positive psychology is found to encourage workers to engage more in organisational tasks, exert more efforts and become more committed to companies. These sequentially lead to lower levels of corporate turnover and absenteeism, which have been embedded in managerial and psychological studies (Griffeth et al., 2000; Hackett, 1989).

Positive impact of leader's happiness on employees' productivity has been demonstrated in previous literature. Barsade (2002) experimentally shows that there is a correlation between leader's positive mood and her followers' job performance. Barsade (2002) also emphasises the importance of power holders to employees' daily lives and suggests that leaders are more likely to be the sender rather than the recipient of positive emotion. In other words, happiness has a contagion effect and leaders can transfer their happiness to followers and make them feel happy at work. Additionally, Oswald et al. (2015) point out that individuals with positive feelings exert more efforts and are more productive. Other similar results have also been found by Clark and Watson (1988), Carnevale and Isen (1986).

Nevertheless, there is little literature that investigates how employees or group members rate their satisfaction with line manager or team leader influence leader's performance as well as how characteristics of the leader relate to subordinates' happiness. Leader-member relationship is not a unilateral one in which leader influences followers and directs them towards achieving common goals. Instead, members sometimes have certain influence on the leader. According to Deluga (1994), a high-quality exchange relationship between leader and member is dictated by mutual

trust and support, interpersonal attraction, and bidirectional influence. This implies managers need to learn more about their staffs, create stronger connection with them, listen to their feedback, and make amendments where necessary to meet with their expectation. It is imperative to note that feedback plays a vital role in developing leader-member relationship and, hence, the effectiveness of teamwork. However, it has not been focused in leadership researches, most of which mainly highlight the impact of leader on followers and how to enhance this impact in organisational context.

Feedback is found to increase one's awareness of his or her own abilities and weaknesses (Thach, 2002). Without feedback, it is challenging for individuals to develop and excel in their fields or career paths. As leader plays an important role in groups' performance and welfare of other group members, feedback is crucial for her to improve leadership ability, group's performance and welfare of other group members. In addition, feedback can improve leader's commitment, efficiency, and on the top of those, it prevents her from exhibiting tyranny. Barro (1973) and Ferejohn (1986) highlight that even elected leaders have incentives for tyranny by exploiting a minority of the group. Happiness or satisfaction of followers with the leader is a typical form of feedback that reveals general evaluation of leader's activities in an organisation. If employees are happier with the firm and their supervisor, they will become more effective and productive (Patterson et al., 2004). Fisher (2010) finds that happiness at work, which includes happiness with co-workers and with supervisors, has positive consequences for either individuals or the organisation.

In most of existing literature, the measurement of happiness level is pretty straight forward. For instance, experimental participants are asked to indicate their happiness by using a 7-point scale (1 is equal to completely sad while 7 means completely happy) in Oswald et al (2015). Furthermore, Barsade (2002) collect participants' self-report and observers' ratings of mood via video-tape to obtain information about individuals' emotion. She mentions that the deployment of two different methods of assessing happiness level is necessary as it gives a more comprehensive understanding of individual's emotion and feeling. Besides rating leaders, in our experiments, group members are even able to vote down the bad leaders at the end of the 15^{th} period. This feature of experimental design allows us to urge selected leaders to work harder as well as collect additional information about followers' satisfaction with leaders' performances. Removal of leader has been often discussed in political studies (Flores and Smith, 2011; Mesquita and Smith, 2010), but has yet to be applied widely in experimental economics studies.

As aforementioned, we are also interested in examining the nexus between leader's characteristics and happiness of group members. Judge et al. (2002) employ big five test to investigate characteristics of leaders and find that extraversion, openness to experience, conscientiousness, and agreeableness positively correlate with leadership. Furthermore, Judge and Bono (2000) prove that transformational leadership, which is typified by charisma, inspiring vision to followers, triggering subordinate's creativity, and supporting followers' personal needs, can be predicted by extraversion and agreeableness. Bass (1985) and Bycio, Hackett, Allen (1995) highlight

that there is a positive relationship between transformational leadership and followers' satisfaction. In order to measure characteristics of individuals, besides big 5, we also deploy a wide range of tests such as psychopathy, cognitive, mathematical tests, etc., to elicit characteristics of experimental participants.

Big Five (Costa and McCrae, 1992) is one of the most popular and widely used personality test. It includes openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Neuroticism refers to individual's emotional stability (Pervin, 1989; Barrick and Mount, 1991) while extraversion tells us how sociable, confident, energetic and talkative a person can be (Greenidge, 2013). Conscientiousness dictates the level to which an individual is organised, determined, purposeful, plan and achievement oriented, efficient, thorough, responsible and reliable (Burger, 2008; Hofstee et al., 1992). Agreeableness reveals the cooperative, considerate and friendly aspects of individual personality (Greenidge, 2013). Finally, openness to experience is typified by one's curiosity of intellectuality, imagination and creativity (Burger, 2008; John and Srivastava, 1999). Judge and Bono (2000), De Hoogh, Den Hartog, and Koopman (2005) study the sensitivity of charismatic leadership to facets of Big 5 while Hogan, Curphy and Hogan (1994) is among a few papers covering the link between human personalities, which are measured by Big 5, and leading capacity. In the current chapter, we compute the Cronbach's alphas for all dimensions of the Big five test after collecting data on participants in the experiments. This allows us to check if the test provides a stable measure of individual personalities over time. We find that the alphas of openness to experience, conscientiousness, extraversion, agreeableness and neuroticism are 0.69, 0.64, 0.64, 0.73 and 0.66, respectively. Since all computed alphas are larger than 0.6, we can conclude that the Big Five is a reliable test for eliciting participants' personality traits.

There are divergent definitions and approaches to psychopathy. While some scientists like Lange and Osterheider (2008) describe psychopathy as a personality disorder characterised by selfishness, misleading conduct, a reckless intention to exploit others and, therefore, has negative effect on employees' job satisfaction (Babiak and Mathieu, 2016; Mathieu et al., 2014), Harpending and Sobus (1987) suggest that psychopathy is an advantageous strategy for individuals to adapt to challenges in life. Psychopathy Personality Inventory (Lilienfeld and Andrews, 1996) and Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995) have been widely applied to assessing people's psychopathy. Levenson Primary and Secondary Psychopathy Scales, which is a 26-item self-report measurement and divided into two main sub-scales: (1) Primary Psychopathy (16 items) and (2) Secondary Psychopathy (10 items).

According to Zaccaro (2001), cognitive ability is not a single skill but actually a set of skills, which are gathering, processing and disseminating information, and learning new knowledge. It is said to be important to leadership as it accounts for a large number of frequent activities a leader involves in on a daily basis (Carroll and Gillen, 1987). From conveying information to active listening, from composing messages to learning and adapting to new knowledge and then to critical thinking, all of them require leaders to have strong cognitive skills to perform well and achieve

highest results possible for organisations (Nguyen and Chmura, 2020). Additionally, Miao, Humphrey and Qian (2016), Gonzalez, Carter and Mount (2017) show that leader's cognitive ability manages to explain variances in employees' job satisfaction. Frederick (2005) proposed a three-item measure to assess one's cognitive ability, which was so-called as Cognitive Reflection Test (CRT), to measure one's cognitive ability. At the time of being introduced, CRT is said to be the world's shortest IQ test. Scores from this test can help anticipate kinds of choices featuring in tests of theories of decision making (Frederick, 2005). Depending on genders, time preferences, and risk preferences, the results from CRT can be varied.

There is an endless dispute over the predictability of mathematical ability about leadership. Kuhn and Weinberger (2005) state that the association between leadership and math test result is not significant by providing evidence of insignificant correlation between math scores and leadership during the period of 1972-1982. In a more recent study, however, Gaudeul and Keser (2017) apply mathematic tests (addition, subtraction, multiplication and division) to selecting leaders for public investment game where experimental participants consider mathematical ability as strong indication for making good investment decisions on behalf of other people. Gaudeul and Keser (2017), therefore, conclude that people, who have high math scores, are more likely to be voted to become leaders. Nevertheless, these individuals, after being elected, tend to allocate groups' output to themselves because they overstate their importance in groups.

Besides, risk attitudes, ambiguity aversion and loss aversion have been examined in various studies for the sake of understanding cooperation in public good game. People with high level of risk aversion and loss version are found to contribute less to the public good (Teyssier, 2012; McCarter et al., 2010) while individuals with more ambiguity aversion make higher contributions (Eichberger and Kelsey, 2002). To measure one's risk attitudes, we deploy Holt and Laury (2005) and Dohmen et al. (2011) while, to measure individual ambiguity aversion and loss aversion, Krahnen, Ockenfels, and Wilde (2013) and Brink and Rankin (2013) are respectively used. In Holt and Laury (2005), there is a list of ordered lottery choices each of which contains two options A and B. While A options are risky gambles on the left hand side, B options are safer ones on the right hand side. To determine one's risk preference, the experimenter has to identify the point at which that participant switches from column A to column B. In specific, according to Holt and Laury (2005), if the participant's switching point is at the third row or above, s/he is said to be risk-loving. If the participant decides to switch right at the fourth row, s/he is classified as being risk-neutral. Also, if s/he switches at the fifth row or below, the experimenter can dictate that participant has a high aversion to risk. A common problem with this risk elicitation test is known as inconsistent preferences where subjects switch back and forth between two columns. Such phenomenon, according to Charness et al. (2013), is due to participants' confusion about the test. To restrict multiple switching points, Jacobson and Petrie (2009), Tanaka et al. (2010) enforce single switching point technique where subjects are asked to indicate at which row they want to switch from A to B. While this method manages to resolve inconsistent choices made by participants, Andersen et al.

(2006) criticise it for ignoring the indifference between choices of participants. In addition, Charness et al. (2013) argue that imposing single switching point reduce the objectivity of the test as it possibly drops subjects who understand the test's instructions and reveal their true preferences between choices.

Risk elicitation test by Dohmen et al. (2011) is also applied in our experiments. Compared to Holt and Laury (2005), it is not incentivised and less complicated as it only inquires how a participant rates her willingness to take risk on a scale of 0 to 10 with 0 equivalent to 'not at all willing to take risks' and 10 equivalent to 'very willing to take risks'. According to Dohmen et al. (2011), their test can offset weaknesses of previous tests for extracting individuals' risk attitudes. As compared to surveys, which are found to generate mixed findings owing to complex instructions, test by Dohmen et al. (2011) is easier to use and understand. Besides, in comparison with risk tests that use real money at stake, it is also less costly and applicable for a large sample of participants. Moreover, by asking individuals a simple question on their willingness to take risks, Dohmen et al. (2011) prove that risk preferences are significantly influenced by demographic elements such as age and gender.

Krahnen, Ockenfels, and Wilde (2013) design a binary choice test to measure one's aversion to ambiguity. In each choice of the test, subjects have to select between two given options in which A is a risky payoff with associated probability and B is an uncertain payoff without probability. Additionally, while payoffs in column B remain across decisions, payoffs in column A vary. Unlike Holt and Laury (2005), ambiguity aversion test takers are supposed to start from the right hand side (column B) and switch to the left hand side (column A) as they proceed down the rows. The points at which participants switch from column B to column A reveal their ambiguity aversion. In specific, if an individual switches side sooner than others, s/he is said to be more averse to ambiguity than other individuals.

Researches on decision making process under uncertainties have been conducted for almost a century with earliest papers by Knight (1921) and Keynes (1921). Gangadharan and Nemes (2009) and Dannenberg (2015) are more recent attempts to learning the cooperation under uncertainties in public good context. It is found that aversion to ambiguity exacerbates cooperative efforts and deteriorates common good outcomes. This is in line with findings by Levati, Morone and Fiore (2009), who show that limited information about public good decline contributions from group members.

Loss aversion is proposed by Kahneman and Tversky (1979) and described as one's stronger sensitivity to losses than equivalent gains. The psychological difference in perception towards losses and gains has been deployed to explain various phenomena in economics, management. While Benartzi and Thaler (1995) use the concept of loss aversion to address equity premium puzzle, Pennings and Smidts (2003) employ it to research the buying strategies of hog farmers. Since there is a vast literature showing its impacts on human's decision-making process (Hardie et al., 1993; Odean, 1998) and cooperative orientation (Kelley and Thibaut, 1978), we want to see how loss aversion influences contribution behaviour in public good game as well as leadership ability in the current study.

Inspired by Holt and Laury (2005), Brink and Rankin (2013) create a menu of ten pairs of binary choices to elicit individual aversion to loss. In each decision, subjects are inquired to select between two given options A and B, both of which provide 50% chances to earn positive outcomes and 50% chances to earn negative outcomes. However, the biggest difference between A and B is that the size of negative outcome in A increases in size as going down the choices list while that of B remains unchanged across decisions. By observing the point at which participants switch from A to B, experimenters can tell the extent to which a person is averse to loss. In practice, the sooner an individual decides to change side from column A to column B, the higher loss aversion s/he has.

Social intelligence, social value orientation, and fluid intelligence are also worth studying as they all affect individuals' decision-making process and hence, their collaboration. Tests of Khorashad et al. (2015), Murphy et al. (2011) and Raven and Court (1998) are used to measure each of the above dimensions, respectively. Social intelligence is defined as the ability to read social situations and accommodate best possible behavioural responses to them. Zaccaro et al. (1991) and Mumford and Connelly (1991) contend that social intelligence is important to leadership and builds up the capability to disentangle issues. To measure one's social intelligence, Khorashad et al. (2015) employ a psychometric test, which is so-called 'Reading Mind in The Eyes test' as it asks participants to tell what other people think or feel by looking at photos of their eyes. In its original design (Cohen et al., 1997), the test provides two possible answers for each photo while, in its revised design (Cohen et al., 2001), the test provides four possible answers for each photo. In our research, we employed the revised version of 'Reading Mind in the Eyes Test' to elicit participants' social intelligence. The maximum score each subject can obtain is 36, which is equivalent to the total loaded items in this test.

Social value orientation, according to Murphy and Ackerman (2014), is categorised into altruism, pro-sociality, individualism and competitiveness on a continuous measurement. Altruistic persons are described as people that help others unconditionally and without expecting rewards in exchange (Dierendonck and Patterson, 2010). Pro-sociality is featured by the incentive to maximise joint payoff or minimise the difference in payoffs between self and others (Murphy and Ackerman, 2014). Individualism or selfishness is one's motive to maximise her own payoff without regard for others while competitiveness refers to the motivation to maximise the difference between own payoff and payoff for the other (Murphy and Ackerman, 2014).

Concepts of social value orientation reveal the extent to which measured individuals concern for other people and has been studied vastly in psychology and behavioural sciences. However, since there are diverse interests and methodologies in studying human's motives, social value orientation is investigated under different names such as social preferences, welfare trade-off ratio or altruism. In De Cremer (2000), pro-social group members are found to contribute more to the public good and show great care for joint benefits as well as equality among individuals. Van Lange,

Liebrand and Kuhlman (1990) report similar results as they assert that people with pro-sociality consider cooperation as rational choice.

In order to label subjects with relevant classifications of social value orientation, Murphy, Ackerman and Handgraaf (2011) introduce a new method with more advanced attributes as compared to previous tools. It is a test with 15 items, each of which requires participants to choose an allocation of points between themselves and the other. There is a series of possible allocations of points in each item and the choices of points allocation will be then input into the below formula to come up with social value orientation (SVO) index:

$$SVO^{o} = \arctan\left(\frac{\bar{A}_O - 50}{\bar{A}_S - 50}\right)$$

where, $\bar{A}_O$ is the mean allocation for other.

$\bar{A}_S$ is the mean allocation for self.

Results computed from above formula help determine one's social value orientation using the following rules (Murphy, Ackerman and Handgraaf, 2011):

- Altruism: $SVO^{o} > 57.15^{o}$
- Pro-sociality: $22.45^{o} < SVO^{o} < 57.15^{o}$
- Individualism: $-12.04^{o} < SVO^{o} < 22.45^{o}$
- Competitiveness: $SVO^{0} < -12.04^{0}$

Fluid intelligence is also known as analytical intelligence, which is documented by Carpenter, Just and Shell (1990) as the ability to judge and resolve novel problems without relying on knowledge learned from schools or experience earned from the past. This type of intelligence is crucial for successful leaders and has been researched in vast literature. McCleskey (2012) highlight that analytical intelligence is undeniably one of the most important cognitive abilities effective leaders need to possess. In Alon and Higgins (2005), analytical intelligence is dictated to be one of significant predictors of successful leadership.

Raven (1962) has well studied about analytical or fluid intelligence and proposed a Progressive Matrices test to assess individuals' rational reasoning ability. The test is a set of 36 visual items which require participants to provide correct answers to. Nevertheless, in our experimental design, we only deploy 18 items of the above test and the final score for each subject is calculated as the total number of correct answers they have given during the test. There is no score reduction in case subjects choose incorrect answers.

Social preferences can be divided into four motives, which are spitefulness, efficiency, egalitarianism and self-interest. Spitefulness refers to the preference to maximise the difference between one's own payoff and that of another while efficiency refers to the willingness to maximise the sum of payoffs for both individuals (Capraro et al., 2017). Also, while egalitarianism refers to the preference to minimise the difference in payoffs between two parties, self-interest refers to one's motivation to

maximise own absolute payoff without concern for the other (Capraro et al., 2017). There are plenty of studies having been conducted on social preferences in relations to cooperative manners as well as leadership ability. Mittal and Dorfman (2012) assert that egalitarianism is one of the five facets of servant leadership while Capraro et al. (2017) highlight that social efficiency and cooperation is positively linked to each other. Regarding spitefulness, Marcus et al. (2014) document that it relates to both exploitativeness and entitlement and it has negative impacts on leadership capability. Self-interest, on the other hand, is strongly embedded in characteristics of individuals, who are unwilling to act as leaders (Gillet, Cartwright and Vugt, 2011). Capraro et al. (2017) relates to our study in the sense that it show how allocation decision can be explained by social motives.

So as to identify social preferences of individuals, we employ method of Bartling et al. (2009), which comprises a menu of binary choices. In each decision, subjects are asked to choose between two options each of which indicates social motives of test takers. There are six decisions to be made across the test and it is important to note that each selection of payoffs for self and the other can indicate more than one social motives. According to Capraro et al. (2017), Bartling et al. (2009) test or BFMS test is more efficient than pre-existing test in terms obtaining subjects' social motives as it is easy-to-understand for participants.

Machiavellianism is depicted as a lack of trust in other people, interpersonal connection, and morality. People with Machiavellianism also tend to take advantage of other individuals (Christie and Geis, 1970). Together with psychopathy and narcissism, Machiavellianism constitutes a component of the Dark Triad and it has been investigated in various documentations. Burks, Carpenter and Verhoogen (2003) and Gächter et al. (2012) demonstrate that Machiavellian subjects exhibit less cooperation in coordination games. Additionally, in leadership studies, leaders with higher Machiavellianism scores have a tendency to give more orders and are less directive than those with lower scores. They are also reported to frequently seek support and assistance from subordinates in adverse situations (Drory and Gluskinos, 1980). Furthermore, there are disputes over the relationship between spitefulness and Machiavellianism. While Paulhus and Williams (2002) argue that Machiavellianism relates to more self-interest rather than self-harm and, therefore, should have no relationship with spitefulness, Stern (2004) clinically implies the opposite.

MACH-IV test (Christie and Geis, 1970) is widely used to measure Machiavellianism and consists of 20 items. In each item, participants are asked to indicate their level of agreement or disagreement with a given statement on a Likert scale of 1 to 7 with 1 equals to strongly agree and 7 equals to strongly disagree**.** Whenever the subject agrees on a statement that is in favour of Machiavellianism, their scores are added by the number on Likert scale they have chosen. On the contrary, as the subject agrees on a statement that is phrased in the opposite direction of Machiavellianism, their scores are deducted by the number on Likert scale they have selected. The final score on MACH-IV test for each participant is computed as the summed scores of all statements.

Leaders, in our research, are selected by the mechanism proposed by Nguyen and Chmura (2020), in which potential leaders are firstly randomly selected from a pool of participants and then they observe salary offers from all experimental groups before choosing which group they are going to lead. We believe that this way of selecting leaders can offset weaknesses of exogenous leadership, which has been criticised for being non-democratic by Brandts, Cooper and Weber (2015), and promote the legitimacy of selected leaders. Also, prior to being selected as leaders, all participants are required to write short paragraphs telling other participants if they want to become leaders and why they should be selected as leaders. The composed paragraphs bear resemblances to CVs written by job applicants to apply for job vacancies in reality. Since our research is motivated by the incentive to maximise collective outcomes in social dilemma, public good game (Marwell and Ames, 1979) is an ideal environment for us to design all treatments for our study. In its original setting, public good game has four participants, each of whom is endowed with initial wealth. Next, they have to decide how much they are willing to donate to the public good. Any amount retained by an individual will stay the same in his or her account while each unit of contribution generates a marginal per capital return, or MPCR, of 0.5, which is a measure of what an individual gets back from one-unit contribution to the public good (Davis and Holt, 1993). It is important to note that even if a player does not contribute, s/he still receives the equal allocation of final output. Such kind of player is so called as free rider. Game theorists predict that players will not contribute anything as human beings are selfish. Nevertheless, experimental studies observe an average contribution of 50% or above of total endowment to the public good.

III. Experimental Design

Our design is a variation of linear public good game in which group leaders are selected through a salary offer mechanism. Chosen leaders and their followers are then endowed with initial wealth denoted in experimental currency units and have to decide how much to contribute to the common good. It is noted that leaders make no contribution in our design. The total contribution is multiplied by a multiplier of 1.5 (Ertac and Gurdal, 2012) before either being redistributed to group members by leaders or being equally shared among players depending on particular treatments. Group members, moreover, can evaluate performances of their leaders at the end of each period by rating their happiness or satisfaction on a scale from one to five. Our design is believed to captivate attention from politicians, economists, psychologists and managerial experts as social dilemma, which is a trending topic in social sciences, arises when participants involve in joint interest situation and the role of leadership in improving collective efficiency is also highlighted.

We conduct seven treatments in total at the University of Nottingham's Centre for Research in Behavioural Sciences (CRIBS) in the UK. Participants are recruited from the university's pool of subjects using ORSEE (Greiner, 2015). Qualtrics (Qualtrics, Provo, UT) and z-tree software (Fischbacher, 2007) are employed to design surveys and

program experiments. At the end of each experimental session, participants are paid in cash using conversion rate of 108 ECU/£. A brief description of all seven treatments is presented as the following:

- **Treatment 1 (baseline) (*LN*):** no leader, six groups of three members play public good game
- **Treatment 2 (*LP*):** leaders are voted, six groups of four members play the public good game
- **Treatment 3 (*LA*):** leaders are voted, six groups of four members play the public good game, and leaders decide how much to allocate to group members.
- **Treatment 4 (*LCC*):** leaders are voted, six groups of four members play the public good game, final output is equally shared among members, and leaders send common messages.
- **Treatment 5 (*LAH*):** leaders are voted, six groups of four members play the public good game, final output is determined by group leader, and leaders are able to see happiness level of group members.
- **Treatment 6 (*LIC*):** leaders are voted, six groups of four members play the public good game, final output is equally shared among members, and leaders send individual messages.
- **Treatment 7 (*LCCH*):** leaders are voted, six groups of four members play the public good game, final output is equally shared among members, leaders send common messages and can see the happiness level of group members.

In the current study, we mainly employ six treatments, which are treatments *LP*, *LA*, *LCC*, *LAH*, *LIC*, and *LCCH*. Details of *LP* can be referred to chapter 1. In treatments *LA* and *LAH*, which are also known as allocation treatments group, 14 participants are recruited from the university's pool of subjects and firstly required to complete a series of characteristics and abilities tests such as Big 5, psychopathy, cognitive reflection, and mathematics. Besides, we ask require participants to take tests for risk preferences, loss aversion, ambiguity aversion, social preferences, social intelligence, fluid intelligence, social value orientation, and Machiavellianism. Next, each participant is provided with instructions on the public good game and asked to compose a short paragraph telling if they want to become a leader and why they should be selected. In the following stage, computer randomly selects five individuals to become candidates for leadership while other participants are formed into small groups of three at random. Then, written paragraphs of potential leaders are displayed to provide group members an insight into each leadership candidate. After this, group members have to decide how much salary they want to offer to each potential leader with a view to recruiting them for leading position. The offering amounts are expressed as percentage of the group's final output. In the next stage, leadership candidates observe the total offer of each group and determine which groups they are going lead. Since there are only three groups while there are five leaders, two leaders who cannot select groups temporarily stop the experiment.

After all groups select their leaders, they move to public good game stage in which each participant is endowed with an initial wealth and has to make decision on how much to donate to public good. While any amount donated to public good is multiplied by 1.5 (Ertac and Gurdal, 2012), resulting in an MPCR of 0.5 (Davis and Holt, 1993), the amounts retained by players earn a return of 1 (Ramalingam et al., 2016). In the next stage, only group leaders participate and they have to determine the allocation amount each follower deserves receiving based on their contributions. The experiment continues and group members have chance to observe groups' outcomes as well as their profits for the current experimental period. The payoffs for group members are calculated as below:

$$w_j = a - L_{i,j} + b_j$$

where, w_j: the earnings (in percentage of final output) for group member j (j=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary (in percentage of final output) for leader i (i=1, 2, 3, 4, 5) by group member j (j=1, 2, 3).

b_j: allocated amount (in percentage of final output) for group member j (j = 1, 2, 3) determined by the leader.

Additionally, group members are asked to rate their happiness with their leaders' performances. Leaders, on the other hand, can only observe groups' outcomes and their own profits during this stage. The formula to calculate payoffs for leaders are presented as the following:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3} + (p - b_{i,1} - b_{i,2} - b_{i,3})$$

where, w_{Li}: the earnings (in percentage of final output) for leader i.

$L_{i,j}$: the salary offer (in percentage of final output) made to leader i by member j. Noted that $L_{i,j}$ lies within [0,a], where $\boldsymbol{a}$ is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

p: group's remaining output (in percentage) after paying $\boldsymbol{a}$.

$b_{i,j}$: allocation amount to member j of group led by leader i.

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

Up to now, treatments *LA* and *LAH* are exactly the same in terms of experimental stages. However, in the very next stage, these two treatments start to differ (*Figure 6*). While all participants in *LA* return to public good game stage after ranking their leaders' performances, group leaders in *LAH* continue to the next stage where they can observe the results of happiness rankings. All participants in *LAH* return to public good game stage after leaders receive the information about the happiness level.

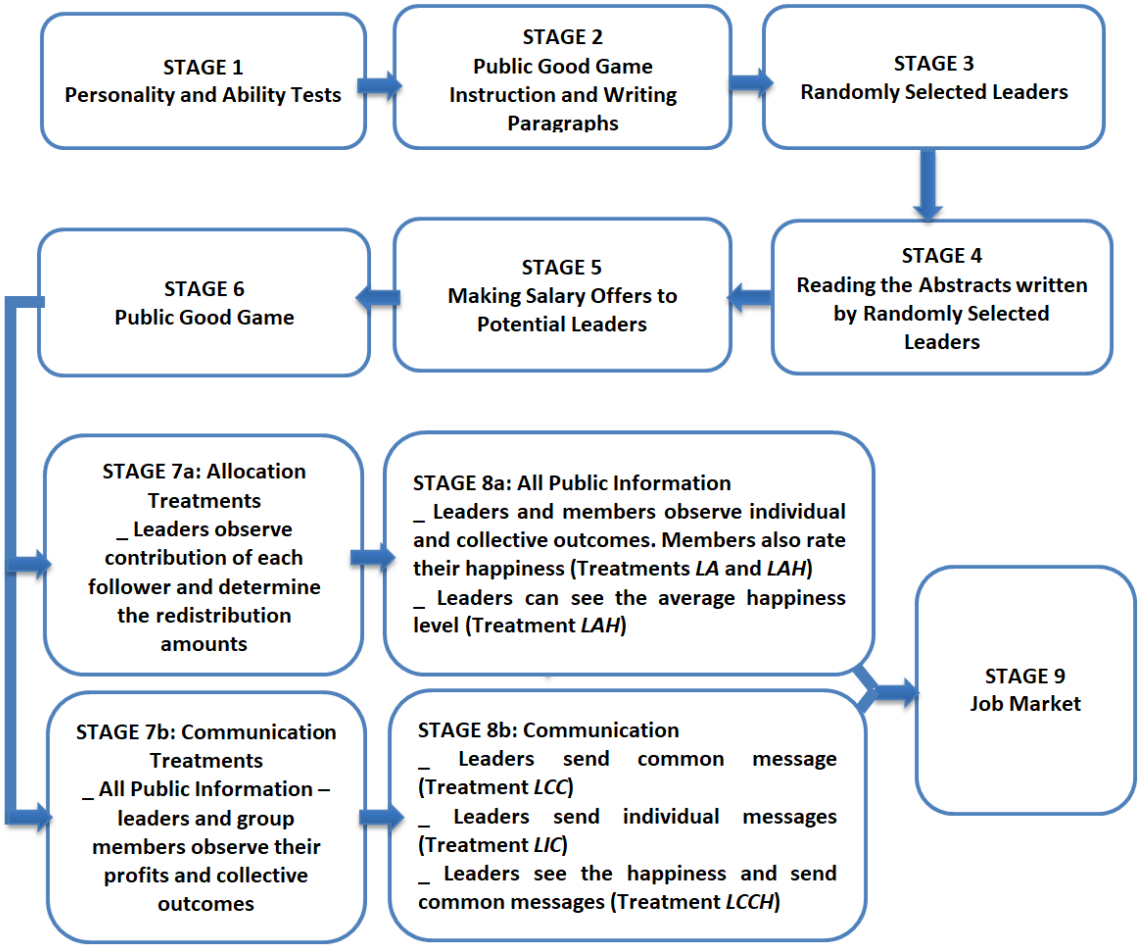


Figure 6: Flow chart of stages in treatments *LP*, *LA*, *LAH*, *LIC*, *LCC* and *LCCH*.

As can be seen from *Figure* 6 communication treatments' stages are similar to allocation treatments. However, they differ from treatments *LA* and *LAH* in stage 7 and stage 8. In particular, in stage 7, while leaders in *LA* and *LAH* observe the contribution of each group member and then decide the allocation amount for each follower, both leaders and members in treatments *LCC*, *LIC*, and *LCCH* observe the outcomes of their groups. Payoffs for followers in communication treatments are calculated using the below formula:

$$w_j = a - L_{i,j} + p/3$$

where, w_j: the earnings (in percentage of final output) for group member j (j=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary (in percentage of final output) for leader i (i=1, 2, 3, 4, 5) by group member j (j=1, 2, 3).

p: group's remaining output (in percentage) after paying ***a***.

while formula to calculate leaders' earnings are shown as the following:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3}$$

where, w_{Li}: the earnings (in percentage of final output) for leader *i.*

$L_{i,j}$: the salary offer (in percentage of final output) made to leader *i* by member *j*. Noted that $L_{i,j}$ lies within [0,α], where $\boldsymbol{\alpha}$ is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

In stage 8, while all participants in treatments *LA* and *LAH* see the outcomes of their groups, leaders in treatments *LCC*, *LIC*, and *LCCH* send messages to their followers before the experiment returns to public good game stage. Among communication treatments, there are also differences. Between treatments *LCC* and *LIC*, leaders employ different types of communication with their followers. While each leader in *LCC* compose a message and send it to all three members of the group, *LIC*'s leaders compose three different messages for each group members. Besides, leaders in *LCC*, after sending common messages, they, together with group members, return to public good game stage while *LCCH*'s leaders, after sending common messages, continue the experiment by observing the average happiness level of all group members. This provides leaders in *LCCH* a better understanding about their own performances and helps them improve their leading activities with a view to enhancing happiness of group members, which in turn increase efficiencies of groups. The difference between treatments *LIC* and *LCCH* is even more obvious. Leaders in *LIC* send individual messages while *LCCH*'s leaders send common messages. Also, *LIC*'s leaders cannot see the group members' happiness with them while leaders in *LCCH* can observe the average happiness level of group members.

At the end of period 15, however, all of the above treatments are once again similar to each other. In stage 9, group members of all treatments can express their intention to keep or remove their current leaders. There is a game restart right after stage 9, but participants are kept uniformed about this.

Based on our experimental design, research hypotheses for the current study are discussed and presented as the following. We firstly want to gauge a link between allocation behaviour of leaders and followers' happiness. Lawler and Porter (1967) are among the first authors to look into the causal relationship between rewards and employees' satisfaction at work. In experimental economics, De Cremer and Knippenberg (2003) relate to our study in the sense that they investigate the satisfaction of group members with group leaders' fairness on assessing followers' performances.

Hypothesis 1: *Group members' happiness is positively related to allocation amount distributed by leader.*

Removal of leadership has been learned in political studies and proved to have significant influence on leaders' performance. Flores and Smith (2011) examine the impact of leadership removal on political leaders' efforts in promoting the electability of their parties in the next election. However, in experimental economics context, there is little understanding on the link between leadership removal and leaders' working efforts as well as collective outcomes. The second hypothesis is, therefore, designated for investigating this relationship:

Hypothesis 2: *Low-performance groups tend to remove their leaders more often than better-performance ones.*

Our third hypothesis is inspired by the work of Alniacik et al. (2011) and Shirin and Kleyn (2017), which show the relationship between employees' first impression on corporate reputation and their affective commitment. In our experiments, written abstracts provide initial information about potential leaders and if they are well-written those abstracts can be a decisive factor in driving happiness of group members with selected leaders.

Hypothesis 3: *Group members have better impressions on leaders writing authentic, social and cooperative abstracts.*

Authenticity is a crucial factor of successful leadership (Gardner et al., 2009) while cooperativeness is one of important social characteristics of leaders (Daft, 2008). Besides, messages written by leaders should be performance-relevant and incentivise group members to contribute to the public good (Hamman et al., 2011; Brandts et al., 2015). Thus, hypothesis 4 is as below:

Hypothesis 4: *Group members are happier with leaders, whose messages are authentic, incentive and cooperative.*

Feedback is important to leaders as it provides them with further information about their performances and what they need to improve so as to accomplish better outcomes in the future (Thach, 2012). We, therefore, conjecture that leaders, who can observe group members' evaluation, perform better than those being unable to observe happiness of followers:

Hypothesis 5: *Seeing group members' assessment aid leader to improve collective outcome of teamwork.*

Salary offers can be seen as commitment to group success that each follower makes because the higher salary offers they give to leadership candidates the higher expectation they have for choosing good leaders, who in turn manage to elevate groups' total contributions. Furthermore, a highly committed individual tends to

contribute more to the public fund (Croson, 2007). Hence, the sixth hypothesis, in this chapter, is presented as the following:

Hypothesis 6: *Group members, who make high offers to selected leaders, have stronger commitment to the groups' successes and, therefore, contribute more to the public good.*

IV. Data Analysis and Discussion

1. Members' happiness and allocation from leaders

Hypothesis 1: *Group members' happiness is positively related to allocation amount distributed by leader.*

Happiness has long been studied by scientists to see if it incentivises employees to work harder and enhance efficiencies of organisations. Oswald et al. (2015) show that happy staffs have their productivities increased by almost 12% while Barsade (2002) experimentally demonstrates that happiness aids increase cooperation and, hence collective outcomes. Therefore, increasing followers' happiness or satisfaction is an important task leaders should uphold. Lawler and Porter (1967) and Locke and Latham (1990) highlight the causal relationship between rewards and happiness. Fisher (2010) also supports these findings.

In the current study, we want to investigate whether group members become happier in case they receive more allocation from leaders. So as to achieve this goal, we run regression of average happiness of all group members on the leader's allocation amounts throughout periods. To extend our analysis, in the below model, we also control for group's contribution to see if collective output influences the satisfaction of group members as well. Data collected from treatments *LA* and *LAH* is employed for this hypothesis. In order to provide a close look at the strength of the link between leader's allocation and group members' happiness, we present regression results for the first phase, second phase, and both phases.

An F-test is performed on the two-phase regression model (periods 1-30) to check for its overall significance. The F-statistic of 35.73 (p-value < 0.0001) allows us to confirm that our model is overall significant and, hence, we continue discussing regression results in the following.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Allocation from Leader	.0117083***	.0102796***	.0116732***
	(.0031001)	(.0036525)	(.0023984)
Contribution	.0167473***	.0174041***	.0156559***
	(.0052014)	(.0047972)	(.0034854)
Constant	2.285145	2.098219***	2.200303***
	(.1768931)	(.1814074)	(.1271615)
Observations	180	180	360
Adjusted R-squared	0.1658	0.1636	0.1621

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 19: Pooled OLS regression predicting group members' average happiness.

As can be seen from *Table 19*, both allocation from leader and group's contribution consistently drive group members' happiness upwards across time spans. Spearman rank correlations between followers' happiness and leader's allocation as well as between followers' happiness and group's contribution in the first phase (n = 180, p < 0.0001), second phase (n = 180, p < 0.0001) and both phases (n = 360, p < 0.0001) confirm our findings. The results are in line with existing literature in labour economics, leadership, and management as well.

Furthermore, Fisher (2010), Pfeffer (1998) and Lawler (1992) imply that rewarding based on organisational performances elevate employees' engagement and satisfaction. In chapter 1 (Nguyen and Chmura, 2020), we demonstrate that allocation from leader is positively determined by the contribution level. In the current hypothesis, we manage to prove that, average happiness of group members is positively driven by allocation from leader and group's contribution. Hence, we conjecture that if leaders allocate or reward group members on a fairly basis, based on their contribution levels, leaders can increase satisfaction of group members. Our current hypothesis is, therefore, reinforced.

Result 1: *The more output the leaders allocate to group members, the happier the group members are.*

2. Group's performance and removal of leader

Hypothesis 2: *Low-performance groups tend to remove their leaders more often than better-performance ones.*

Leader removal and its impacts on leader's performance have been widely studied in politics research. Flores and Smith (2011) and Mesquita and Smith (2010) employ the power to remove leaders of voters to investigate party leaders' efforts to

survive and promote the electability of their parties. However, this democratic mechanism has not been popularly studied in the context of experimental economics or management. In our experiments, since we allow group members to decide whether to keep or remove their leaders at the end of each phase, we want examine if the decision to sack a leader depends on collective outcome and the capacity to lead. We hypothesise that underperformed groups blame their low performances for poor leadership and, hence, decide to remove their leaders and look for better ones.

So as to demonstrate our hypothesis, we initially determine the total number of 'yes' answers to the question 'Do you want to remove your current leader?', which we ask group members in the last period of each phase. The calculation is conducted for each selected group leader. We also calculate the average performances of groups led by these leaders. Then we regress aggregate values of 'yes' answers on relevant average group performances. Results from this regression can help us draw conclusion on the interaction between group's productivity and the removal of leader. Data from treatments *LP*, *LA*, *LCC*, *LAH*, *LIC*, and *LCCH* is employed for this hypothesis and we present regression results for the first 15 periods, the second 15 periods, and for all 30 periods.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Average group's performance	-.050183*** (.0150371)	-.0222736* (.0109439	-.0309463*** (.0088136)
Constant	2.660986 (.4446104)	2.00154*** (.358026)	2.190917*** (.2748174)
Observations	36	36	72
Adjusted R-squared	0.2246	0.0824	0.1376

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 20: Pooled OLS regression predicting the number of votes to remove leader.

Before discussing regression results, it is noticed that an F-test is conducted for two-phase regression model (periods 1-30) to check its overall significance. The F-statistic of 12.33 (p-value < 0.001) allows us to confirm that our model is overall significant and fits better than an empty model.

As can be seen from the table above, there is a consistent negative relationship between groups' performances and the decision to remove leaders. Spearman rank correlations for the first phase (n=36, p<0.1), second phase (n=36, p<0.1) and both phases (n=72, p<0.1) confirm our results. These indicate that as the group's performance increases it is less likely that the group leader is voted to be removed. In other words, leaders, whose groups perform well during each experimental phase, tend to survive or remain in leading position. Our finding is in line with existing literature in politics. Moreover, Mesquita and Smith (2010) remark leader's provision of

public good plays a prerequisite role in buying and maintaining loyalty as well as cooperation of followers.

Bar charts showing the relationship between groups' average contributions and the number of removal votes can be found in *Appendix 4*.

Result 2: *Low-performance groups have a higher tendency to remove their leaders after the first phase.*

3. Group members' happiness and leaders' abstracts

Hypothesis 3: *Group members have better impressions on leaders writing authentic, social and cooperative abstracts.*

In this hypothesis, we want to investigate the relationship between leaders' abstracts and their group members' happiness. We conjecture that impressions made by potential leaders on group members through their written abstracts persist through time and influence group members' evaluations on their leading capacity. Our hypothesis is inspired by Shirin and Kleyn (2017) and Alniacik et al. (2011) which both examine the relationship between initial perception of employees on corporate reputation and their affective commitment. Also Alniacik et al. (2011) also show that staffs' perception towards company's reparation can also influence their job satisfaction. In addition, through this hypothesis, our aim is also to see if abstracts of leaders receiving higher offers in the voting stage have similar patterns as abstracts of leaders being highly rated on satisfaction scale. It is important to note that the leaders who receive higher offers are not necessarily the ones taking leading positions in experimental groups.

Tobit regression model is applied to find the correlation between happiness of group members and abstracts written by selected leaders since happiness level is bounded between the lowest value of 1 and the highest value of 5. Results are displayed in *Table 21* and reported in three different time spans to provide overview of the strength of all correlations between dependent and independent variables over time. Employed data is from treatments *LP*, *LA*, *LCC*, *LAH*, *LIC*, and *LCCH* in which leaders are voted through salary offering mechanism.

As can be seen from regression results in *Table 21*, in the first phase, group members are more satisfied with leaders whose abstracts richly employ first-person plural pronoun 'we' and social words. In addition, they also prefer leaders with abstracts having more rewarding, money-related and causal words and focusing more on the present. Group members dislike leaders whose abstracts use many impersonal pronouns, affective and work-related words. Frequent use of 'we' make others feel more engaged and connected with writers while social words allow them to create friendly and sociable impressions with readers or listeners. People with high sociability are also found to employ fewer impersonal pronouns in their communication (Pennebaker and King, 1999; Qiu, Lin, Ramsay and Yang, 2012). Words of affection, which is a sub-category of social dimension, are used to express one's emotion and

have a strong link to emotional intelligence. While some scientists state that affective leadership is effective (Weinberger, 2009), others cast doubt on emotional intelligence as an important element of leadership (Follesdal and Hagvet, 2013).

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
We	.1064364* (.0568711)	.2493308* (.1339225)	.1534497** (.0630758)
Impersonal pronouns	-.0682926** (.024846)	-.0649475* (.0353547)	-.065182*** (.0243097)
Affect	-.0701008*** (.0133068)	-.0342079** (.0163168)	-.0477075*** (.0117527)
Social	.0309585** (.0126357)	.029845* (.0152547)	.0275277** (.0108228)
Cause	.0586664** (.0217049)	.0426542 (.0280307)	.0439964** (.0197352)
Reward	.0514424** (.0186309)	.0556126** (.0238839)	.0413622** (.0181532)
Focus on present	.0235932* (.0127753)	-.0017025 (.0158292)	.0066645 (.0115357)
Work	-.0284291** (.0126672)	-.0465919** (.0185794)	-.0266377** (.0120535)
Money	.0468652** .0213107)	-.0179342 (.0547723)	.0267461 (.0216834)
Power	---	-.0535857* (.0296037)	-.0228252 (.018876)
Negate	---	-.0989694* (.0518646)	-.1112838** (.043258)
Insight	---	.0501965* (.0293276)	.0291795 (.0253616)
Focus on past	---	.1469455** (.0552011)	.0517461 (.0379434)
Constant	2.627439*** (.4509723)	3.223301*** (.4278489)	2.95374*** (.3473969)
Observations	36	36	72
Chi-squared test (p-value)	0.000***	0.0218**	0.0000***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 21: Tobit regression predicting satisfaction of group members.

Additionally, uses of causal words, which are a sub-category of cognitive process, signal high level of rationalization (Pennebaker and King, 1999) as well as provide indication on authenticity of leaders (Newman et al., 2003). Regarding reward-related and money-related words, we conjecture that group members highly evaluate leaders, who use these two word categories more often in their abstracts, because they care about monetary benefits from playing the public good game. Heavily emphasizing on work-related issues and outcomes can increase perceived workload and competition, which in turn causes pressure on group members and decreased happiness at the workplace. This argument has been indicated in various studies by Yao et al. (2014), Burns (1978) and Zhao (2003). Last but not least, focusing on present is indicative of leaders' attention on what is happening and display their motives to get involved (Biber et al. 1998). Present tense is also found to be in positive adverts and in affiliation-oriented people (Tausczik and Pennebaker, 2010; Pennebaker, Mehl and Niederhoffer, 2002).

In the second phase, a similar pattern of leaders' abstracts is preferred by followers. Furthermore, group members prefer leaders with abstracts consisting of following additional features. They are happier with abstracts employing more insight words and displaying concentration on the past. Also, they are less satisfied with leaders writing negating and power-focused abstracts. These findings in the second phase are worth discussing in details as they show how group members' interests have altered. Group members no longer prefer abstracts that focus on the present and become interested in past-oriented paragraphs. In the text analysis, leaders mainly use past tense in their abstracts to mainly talk about their leadership experience, refer to their own backgrounds or express in their intention to become leaders (in past subjunctive form). Power-oriented leaders are implied to make followers feel suppressed (Fodor and Smith, 1982) while negation words are found to be negatively correlated with one's confidence. Insight words have replaced causal words in the second phase to become a factor in leaders' abstracts driving group members' happiness. Similar to causal words, words of insight belong to cognitive process and also suggest rationalization of the writers (Pennebaker and King, 1999; Pennebaker, Mehl and Niederhoffer, 2002).

In general, we find that happiness or satisfaction of group members is positively determined by third-person plural pronoun 'we', social, causal and reward-related words and negatively determined by impersonal pronouns, affect, work-related and negating words. We conjecture that group members have good impressions with leaders, whose abstracts are authentic, inclusive, sociable, but not affective, and more rewarding than work-relating. The overall significance of our findings is confirmed by the likelihood-ratio test (likelihood ratio = 45.03 and p-value =0.0001).

Group members' happiness of with leaders' decisions can also be driven by the group's performance measured by the total final output the group generates by the end of each period. Hence, in the below Tobit regression (*Table 22*), we want to control for group's final output with a view to checking robustness of regression results in *Table 21*.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
We	.121924**	.1966752	.1578762**
	(.0548471)	(.1299823)	(.0594905)
Impersonal pronouns	-.0544808**	-.0617333*	-.0526979**
	(.0247909)	(.0336235)	(.023296)
Affect	-.0708951***	-.0290467*	-.0452573***
	(.0126967)	(.0157187)	(.0111113)
Social	.025074*	.0194379	.0210642**
	(.012444)	(.0154201)	(.0104297)
Cause	.0494208**	.035183	.0385106**
	(.0212664)	(.0268946)	(.0186974)
Reward	.0403073**	.0434408*	.0322425*
	(.0187146)	(.0235109)	(.0173842)
Focus on present	.0207578	-.0093203	.0002511
	(.0122746)	(.0155238)	(.011085)
Work	-.0189401	-.0398123**	-.0180739
	(.0130778)	(.0179801)	(.0117183)
Money	.0324793	-.0224701	.0126162
	(.0216958)	(.0520799)	(.0209807)
Power		-.0492644*	-.0298573
		(.0282062)	(.0179515)
Negate	---	-.0830529	-.0969956**
		(.0499227)	(.0410641)
Insight	---	.0365636	.016927
		(.0287022)	(.0242593)
Focus on past	---	.1033338*	.0280079
		(.0569014)	(.0366412)
Group's Output	.0144362*	.0200862*	.0195667***
	(.0076231)	(.0101762)	(.0065259)
Constant	2.41829***	2.931798***	2.70101***
	(.4440145)	(.4324217)	(.3382213)
Observations	36	36	72
Chi-squared test (p-value)	0.000***	0.0108**	0.0000***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 22: Tobit regression predicting satisfaction of group member (controlled for group's final output).

A Chi-squared test is conducted to test the goodness-of-fit the above regression. Since the test's likelihood ratio is 53.50 ($p < 0.0001$), we are able to confirm the overall significance of our model.

As can be seen from the above table, after controlling for group's final output, determinants of group members' happiness have changed. In particular, in phase, 1, the happiness with leaders is positively determined by 'we' pronoun, social, causal and rewarding words and the group's final output while it is negatively driven by impersonal pronouns and affective words. In phase 2, group members' satisfaction with leaders is positively influenced by rewarding and past-oriented words and the group's final out put while it is adversely decided by impersonal pronouns, affective, rewarding, work-related and power-oriented words. Overall, throughout two phases, leaders, whose abstracts employ more 'we' pronoun, more social, causal and rewarding words, receive higher satisfaction from group members. Those leaders are also ones who manage to increase collective performances. On the other hand, leaders, whose abstracts use impersonal pronouns, affective words and negations, are less preferred by followers.

Result 3: *Group members have good first impression with leaders, whose abstracts are more authentic, inclusive, sociable, rewarding and employ less affective, work-related words and negations. When controlled for the group's final output, group members' happiness is no longer affected by work-related words in leaders' abstracts.*

4. Group members' happiness and leaders' messages

Hypothesis 4: *Group members are happier with leaders, whose messages are authentic, incentive and cooperative.*

In hypothesis 3, we have seen how group members are happy with leaders' written abstracts and, hence, understand more how potential leaders create their good first-impressions with group members or subordinates. In the current hypothesis, we want to draw a link between group members' happiness and messages written by leaders in communication treatments. We expect to see how these messages drive the evaluations of group members' happiness overtime as well as distinguish the differences between common and individual communication in terms of increasing followers' satisfaction.

We firstly employ data on group members' happiness of three treatments *LCC*, *LIC* and *LCCH* and regress them on word categories generated by text analytics software of LIWC2015. These word categories are produced based on analysis of all text messages written by group leaders in common communication treatments *LCC* and *LCCH* and individual communication treatment *LIC*. Moreover, we run two different regressions in this hypothesis. One is on common messages and other one is on individual messages. This separation allows us to distinguish the influence of each communication method on group members' happiness and facilitate our comparison between two treatment groups. Tobit regression model is employed as average

happiness of group members has its lower and upper limits of 1 and 5, respectively. In addition, regression results are presented for each experimental phase to provide a close look at the strength as well as the changes in group members' happiness with leaders' messages from one phase to another.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Word Count	.040759***	.0016093	.0201001
	(.0148793)	(.0293325)	(.0130779)
Clout	---	.0126815***	.0001091
		(.0045944)	(.0030128)
Function	.0155224***	.0133253**	.0176479***
	(.0056799)	(.0051348)	(.0038927)
She He	.1192951*	---	.1062965
	(.0686315)		(.0720644)
Verb	.0243371***	.006474	.0119202***
	(.0074547)	(.0039534)	(.0036085)
Compare	---	-.024703**	-.0200848**
		(.0117437)	(.0089492)
Number	---	.0207961***	.0208128***
		(.0036153)	(.0033808)
Friend	.0963328***	.0098012	.0672579***
	(.0141608)	(.0253805)	(.0126598)
Discrepancy	-.0694792**	-.0509229*	-.0502402**
	(.0288918)	(.0282415)	(.021262)
Affiliation	---	.0132446**	.0194573***
		(.0051844)	(.0046457)
Risk	.1942124**	.4609074**	.188595***
	(.0741235)	(.2153054)	(.0717242)
Leisure	-.0834349*	-.1582253**	-.1302181***
	(.0463752)	(.0689318)	(.0391109)
Constant	.5041199*	.4871245*	.8190114***
	(.2723771)	(.2784311)	(.2162856)
Observations	180	180	360
Chi-squared test (p-value)	0.000***	0.000***	0.000***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 23: Tobit regression on predicting group member's happiness in Treatments *LCC* and *LCCH*.

Results for the first regression model is shown in *Table 23* and provide details about relationships between group members' happiness and word categories, which come from the text analyses of all common messages written by leaders in treatments *LCC* and *LCCH*. In the first phase, group members' happiness with leaders is positively driven by words count, function words, third-person pronouns (e.g. she, he), verbs (e.g. regular verbs, auxiliary verbs), friendly and risk-related words while it is negatively determined by discrepancy and leisure words. Words count reveals the total number of words in each common message written by leaders and indicate how engaged the leaders are in their communication (Tausczik and Pennebaker, 2002). In addition, a high number of words count signal better quality of conversations (distribution of words count for leaders' messages is provided in *Appendix 9*). Third-person pronouns (e.g. she, he) are recorded to be frequently found in truth-tellers' messages and display higher level of social focus on other people (Newman et al., 2003). In addition, third-person pronouns, together with function words and verbs, play an important role in shaping writers' linguistic styles and improve cohesiveness of text writing (Pena and Pan, 2016). In terms of risk-related words, they show how risk-focused the writers are and how carefully they consider about dangers or costs of moves they make (Jordan and Pennebaker, 2015). This also implies that individuals with high risk aversion place less interest on leisure activities resulting in lower deployment of leisure-related words in their communication. Friendly words are sub-category of social words and reveal the level of being friendly and sociable of the writers. Last but not least, Pena and Pan (2016) highlight the use of discrepancy words suggests that an event did not occur in a desirable way and reveal that the writer or speaker was not well-prepared for it. They also find that conscientious people, who have strong determination, use this kind of word category less. In the current research, as discrepancy words are found to be less preferred by group members, it is hypothesised that group members mostly satisfy with well-prepared and strongly-determined leaders.

Based on what have been discussed, we conjecture that, in the first phase, group members are happier with leaders, who send more engaging and friendly messages with social focus on group members. In addition, group members are satisfied with messages showing leaders' focus on risk, being organised and strongly determined.

In the second phase, there are some changes in group members' happiness with leaders' messages. It is found that group members' satisfaction is positively determined by clout, function words, numbers and affiliated and risk-related words while it is adversely affected by comparative, discrepancy and leisure-focused words. Apart from function words, discrepancy, risk-related and leisure-focused words, other word categories are new determinants of followers' happiness in the second phase.

Clout is said to relate to authoritative and confident writing. It also exhibits one's leadership ability (Filippou et al., 2019). Additionally, Pennebaker et al. (2015) show that clout expresses a sense of bold confidence and decisive certainty. Function words consist of a wide range of sub-categories including pronouns, verbs, articles, conjunctions and prepositions. Regardless of content, it is suggested that the deployment of function words, especially first-person pronouns, reflects authenticity of

the writers or speakers (Newman et al., 2008). In terms of numbers, Bono and Ilies (2006) discover that, beside pronouns, articles and non-substantive words, numbers are preferably used by leaders in their communication. Affiliation is part of human's drives and refers to one's orientation to ally, liaise, and collaborate (Pennebaker et al., 2015). House, Spangler and Woycke (1990) state that leaders with affiliation orientation can accomplish close contacts and relationships with followers, which in turn facilitate teamwork and corporate visions. Individuals with focus on risk are careful with every single move they make and frequently consider the cost and danger of doing something (Jordan and Pennebaker, 2015). They also approach life in a defensive manner. We, therefore, also deduce that leaders with high sensitivity to risk discuss less about leisure as they want followers to concentrate more on the public good and collective outcomes.

Comparative words are used in leaders' common messages mainly to ask followers to contribute more to the public good. However, it seems group members are not satisfied with messages that employ words of comparison. We conjecture that leaders preferring using comparative words exhibit demandingness and authoritarianism, which consequently decline collective efficacy as followers feel pressured and suppressed. Discrepancy words, according to Pena and Pan (2016), indicate one's regret as an event does not happen in the expected way and signal the writer or speaker is not well-prepared for it in advance. Additionally, Pena and Pan (2016) find that discrepancy words are less used by conscientiousness individuals, who have strong determination.

In the second phase, based on regression results and our analyses, we hypothesise that group members are happier with common messages showing confidence, affiliation, risk aversion and authenticity. They are also satisfied with leaders, who employ more numbers to discuss about groups' outcomes and members' contributions, use fewer comparative words and avoid discussing about undesirable past events.

Overall, throughout two experimental phases, we find that group members' happiness is positively driven by function words, verbs, numbers, affiliation-focused and risk-related words while it is negatively determined by comparative words, discrepancy and leisure-related words. Also, likelihood-ratio test is performed on the Tobit model for all periods (1-30) to check if its regression coefficients are jointly different from zero. As the test's Likelihood Ratio is 122.15 (p-value < 0.0001), we can confirm the overall significance of our prediction model for followers' happiness with selected leaders' common messages. Based on reported results, we hypothesise that leaders, whose common messages are more authentic, cooperative, risk-averse and less comparative, leisure-focused as well as recalling unpleasant memories, are rated higher on the satisfaction scale by group members.

The second regression's results are displayed in the below table and show all links between group members' happiness and individual text messages written by leaders in *LIC*. Similar to treatments *LCC* and *LCCH*, we present we present our findings for three different time spans: first phase, second phase and both phases.

	Phases		
	Periods 1-15	**Periods**	**Periods 1-30**
Tone	.00526* (.0027748)	.0065221*** (.0024127)	.0033627* (.0019131)
Words per sentence	---	-.0817345** (.0364476)	-.0234313 (.0249657)
I	---	-.0320934*** (.0110586)	-.0173426* (.0091304)
You	-.015743* (.0083604)	---	---
Impersonal pronoun	---	.0674857*** (.0253446)	.0168845 (.0152504)
Compare	-.0188139** (.0082141)	-.0246333** (.01233)	-.019192** (.0083911)
Affect	-.0086562** (.0041157)	---	---
Differentiation	---	.1256435*** (.0448039)	.0112294 (.0232367)
Drives	---	-.0082633* (.0044892)	-.0080581** (.0034942)
Affiliation	.0153636* (.008525)	.0133918** (.0067084)	.0146451** (.0058233)
Achieve	---	.0285258** (.0126289)	.0162864* (.0094488)
Power	---	-.1234285*** (.0293562)	-.0497221** (.0225001)
Risk	---	-.2259942* (.1332072)	-.0919941 (.114696)
Focus on past	.0393791** (.0176189)	-.0294777** (.0116109)	-.011229 (.0101743)
Focus on present	---	-.0114583* (.0061016)	-.0090759** (.0040836)
Time	-.0342745* (.0201192)	-.0395524*** (.0133587)	-.0208222* (.0123779)
Assent	.0434313* (.0260831)	-.0174057 (.0693861)	.0013748 (.0293474)
Constant	3.351254*** (.2328983)	3.949284*** (.2091883)	3.541439*** (.1726475)
Observations	90	90	180
Chi-squared test (p-value)	0.0028***	0.0006***	0.0084***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 24: Tobit regression on predicting group members' happiness in *LIC*.

It can be seen that, in the first phase, happiness of group members in *LIC* is positively correlated with emotional tone, affiliation, focus on the past and assent-related words while it is negatively related to second-person pronoun 'you', comparative, affective and time-related words. Emotional tone in LIWC2015 is defined as the density of emotional words in a given text. Words included in this category mainly capture three dimensions of pleasure, approval and attachment (Pennebaker, Mehl and Niederhoffer, 2003). A high score on emotional tone signals writers' preferences on employing positive emotional languages (Filippou et al., 2019). Together with assent, which implies the degree of consensus between individuals, positive emotion is found to be present in groups with high level of agreement (Tausczik and Pennebaker, 2010).

In terms of second-person pronoun of 'you', Tausczik and Pennebaker (2010) highlight that the increased use of 'you' signal low quality of relationship. In other words, less 'you' observed in a given text or speech suggests better connections among individuals. As aforementioned, affective words are associated with one's emotional intelligence and there are doubts about the relationship between emotional intelligence and leadership and, hence, subordinates' satisfaction (Follesdal and Hagvet, 2013). Similar to treatments *LCC* and *LCCH*, comparative words in *LIC* are used to motivate followers to contribute more to the public good. In addition, as we analyse text messages, *LIC*'s leaders also use words of comparison to compare performances between individuals within groups. Levi and Harrison (2009) report that social comparison can consequently lead to negative moods and decreased self-evaluations, especially if that is upward social comparison in which one is compared to a better or more dominant target (Pena and Pan, 2016).

Focus on the past is a dimension of time orientation and show writers' attention on historical events. In this first phase, since group members' happiness positively links to leaders' focuses on the past, we conjecture that they prefer leaders with tendencies to reflect on historical performances. Finally, affiliation reveals the desire to ally, liaise and collaborate with other people of the writers (Pennebaker et al., 2015). Hamman et al. (2011) has proved that leaders with more cooperative messages enhance collective performances effectively.

We hypothesise that, in the first phase, group members are more satisfied with leaders whose messages are more affiliated, present and forward-looking, less comparative and affective and, especially, have positive emotional tone.

In the second phase, group members' happiness is still positively determined by emotional tone and affiliation and negatively driven by comparative and time-related words. However, focus on the past has changed sign and become negatively associated with satisfaction of group members. It is noticed that, besides focus on the past, time orientation in LIWC2015 software also includes focus on the present and focus on the future (Pennebaker et al., 2015). Hence, a negative influence of focus on the past, together with a negative effect of focus on the present that has been found during the second 15 periods, on groups' happiness indicates that followers are now more satisfied with leaders having forward-looking mind-set.

Also, we see there are new determinants of group members' happiness in the second phase. While words per sentence, first-person pronoun of 'I', drives, power-related and risk-related words adversely explain groups' satisfaction, impersonal pronoun, differentiation and achievement-oriented terms positively determine variation in members' happiness. Words per sentence reveal the total number of words written in each sentence. A high score on this variable indicates cognitive complexity while a low score signals simplified language or low level of elaboration on writing. Tausczik and Pennebaker (2010) find that first-person singular pronoun (e.g. I) is often used by depressed people while Newman et al. (2008) broaden implications on increased employment of first-person singular pronoun and link it to one's self-focus. Power-related and risk-focused words reveal individual drives and signal concentrations on power and risk, respectively. While power-oriented leaders are found to less embrace followers' proposals and ideas (Fodor and Smith, 1982), leaders with low aversion to risk are proved to be more efficient and successful (McCrimmon and Wehrung, 1990).

Examples of impersonal pronouns include 'it' and 'those' and they have been said to link to lower level of extraversion and sociability (Qiu et al., 2012). As aforementioned, differentiation, also known as exclusive words, can signal authenticity of writers as liars tend to use less of these words to differ among subjects (Pennebaker and Tausczik, 2003; Newman et al. 2003; Slatcher et al., 2006; Joksimovic et al., 2014). Achievement-oriented words tell how an individual is driven by motivation to achieve (Pennebaker Mehl and Niederhoffer, 2003). A high score on this dimension reveal strong determination of the writers or speakers to win or pursue a target or goal. Besides, as Pennebaker et al. (2003) contend that people with achievement orientation have low usage of present-tense verbs, we assert that the inverse link between focus on the present and group members' satisfaction emphasises the orientation towards achievement of selected leaders in the second experimental phase.

Overall, throughout both phases, we explore that group members' happiness in *LIC* is positively driven by emotional tone, affiliation and achievement-oriented words while it is negatively influenced by I-words, comparative words, power drive, focus-on-the-present and time-related words. A likelihood-ratio test is conducted on Tobit model for all periods (1-30) to check if its regression coefficients are jointly different from zero. Since the likelihood ratio of the test is 31.14 (p-value < 0.01), we can reject the null hypothesis that coefficients on model's explanatory variables are simultaneously equal to zero. We, thus, assert that group members in *LIC* are overall happier with abstracts that are positively emotional, affiliated, achievement-focused and less self-focused, power-oriented and comparative. Followers also prefer leaders who use less present-tense verbs. As mentioned above, people with orientation towards achievement are documented to employ less present tense (Pennebaker et al., 2003). Hence, we deduce that a negative correlation between focus on the present and satisfaction of group members underscore the overall achievement orientation of group leaders across all periods.

Also, it is important to compare group members' preferences over individual and common communication. Firstly, there are similarities between messages written

by leaders in treatments *LCC* and *LCCH* and treatment *LIC*. Both types of communication are underscored by affiliation, cooperation and lower level of comparison. However, they are different from each other in several aspects. While common messages are overall friendlier, distinctive, decisive and less leisure-focused, individual messages are more positively emotional, achievement-oriented and less self-focused, power-oriented as well as discuss less about past events or outcomes.

Result 4a: *Leaders use more affiliation words, risk-related phrases, verbs, numbers, function words and less comparative words, discrepancy, leisure-related words when they communicate with a group of followers.*

Result 4b: *Leaders have an emotional tone, use more affiliation and achievement-oriented words and employ less 'I' words, comparative and power-related words, time-focused and focus-on-the- present phrases when they communicate with an individual group member.*

5. Observation of feedback results and group's performance

Hypothesis 5: *Seeing group members' assessment aid leader to improve collective outcome of teamwork.*

Feedback plays an important role in improving skills and deficiencies in managers (Thach, 2002). This implies that feedback system is necessary for leaders to understand their job performances as well as identify what they need to do so as to improve collective outcomes. Additionally, without knowing feedback from employees or subordinates, it is hard for leaders to meet with their expectations and hence, decrease subordinates' happiness. As aforementioned, happiness is important to group's productivity and members' efforts. Therefore, we conjecture that leaders, who have full information about followers' satisfaction, deliver better leadership and enable groups to achieve higher success.

We show that almost all stages in treatments *LA* and *LAH* are similar except for the final one in which *LAH*'s leaders are given information about average happiness of their followers. Using the same rationale dictated above, we hypothesise that performances of groups in *LAH* should be better than those in *LA*. We firstly compute the average performances of all groups in treatments *LA* and *LAH* in the first 15 periods, the second 15 periods and then 30 periods. Then, for each time span, we apply non-parametric Mann-Whitney U-test to investigate the difference in average performances between groups in treatments *LA* and *LAH*. In the table below, we present the p-values for U-test and also provide statistics of average performances of investigated groups.

	Observations	Phases		
		Periods 1-15	Periods 16-30	Periods 1-30
Average group's performance (Treatment *LA*)	6	8.590313 (3.612209)	7.273193 (3.670875)	7.931753 (3.468883)
Average group's performance (Treatment *LAH*)	6	9.426268 (1.093526)	12.70167 (2.005867)	11.06397 (.9262879)
p-value		1.0000	0.0250**	0.0547*

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 25: Comparison of average performances of groups in treatments *LA* and *LAH.*

It can be seen that although there is no statistical evidence on the difference in average performances between groups in treatments *LA* and *LAH* in the first phase, they are significantly different from each other in the second phase (p-value = 0.0250) and in both phases (p-value = 0.0547). Besides, it is important to note that the average performance of all groups in *LAH* is always higher than that of *LA*. We can see, in phase 1, the average performance of groups in *LA* is 8.59 ECUs while that of *LAH* is 9.43 ECUs.

In phase 2, the difference in performances between groups of two treatments is even bigger as *LA*'s groups, on average, contribute only 7.27 ECUs while *LAH*'s groups, on average, donate up to 12.70 ECUs. The average contribution of all groups in *LAH* throughout 30 periods is, therefore, much higher than that of *LA* (μ = 11.06 ECUs and μ = 7.93ECUs, respectively). We conjecture that leaders in *LAH* have more information than those in *LA* to make decisions on allocations to group members. They have both details about groups' performances and knowledge of followers' satisfaction. Leaders in *LAH*, hence, make more accurate decisions on output allocations, which in turn result in followers' increased productivities and efficiencies. Below, we also provide a graph of average total contributions in treatments *LA* and *LAH*. It is noted that, for each treatment, the average value on contribution in each period is calculated as the average of all six independent groups' contributions in that period.

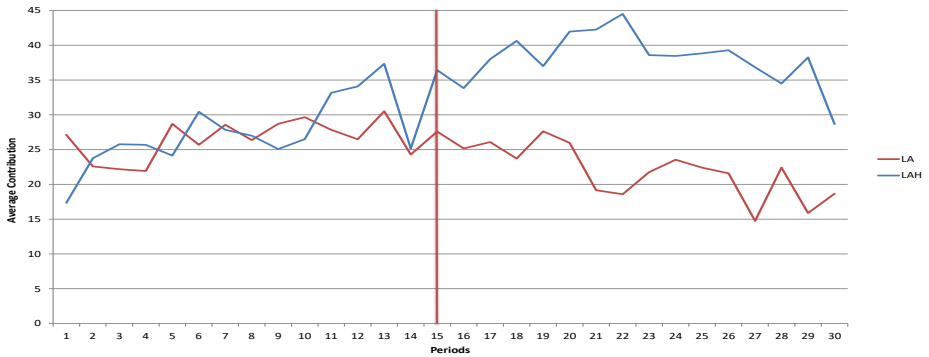


Figure 7: Average Contributions of *LA* and *LAH.*

As can be seen from *Figure 7*, in the first 15 periods, the average total contributions in *LA* and *LAH* are quite similar to each other and there is no end-game effect in the final period of both treatments, which can be because participants in *LA* and *LAH* are not informed about the length of experiments in advance. However, in the second 15 periods, we see a larger gap between average contributions of *LA* and those of *LAH*. Groups of *LAH* contribute significantly higher, on average, than groups of *LA*. This is in line with what have been discussed in the U-test and strengthen our conclusion on the impact of leaders' seeing happiness level on collective outcomes. In addition, the end-game effect is only observed in *LAH* but not in *LA* indicating that participants in *LAH* learn from the first phase that the game lasts for 15 periods and, hence, free-ride in the 15^{th} period of the second phase. In regards to effect of restarting the experiment, we see that there are differences in average contribution between period 1 and period 16 of both treatments although the difference of *LA* is smaller than that of *LAH*. Therefore, the influence of restarting the game is negligible.

Result 5: *Groups of leaders having more information about happiness level of group members outperform groups of leaders without such information.*

6. Salary Offers as an Evaluation System for Leadership Abilities

Hypothesis 6: *Group members, who make high offers to selected leaders, have stronger commitment to the groups' successes and, therefore, contribute more to the public good.*

We have seen so far the importance of evaluations on leaders' performances at the end of each period. However, it is a shortcoming if we do not investigate salary offers that group members make to leadership candidates prior to playing the public good game as they provide insights into how group members rank their preferences and assess the ability to lead of each potential leader. In specific, in the current hypothesis, we want to study the commitment of group members to the groups' success by correlating group members' salary offers with their contributions to the public good. We conjecture that strongly committed team members give more to the common good if they can choose the leaders they like and the preferences for leaders are measured by the amounts of fixed salaries those members offer to leadership candidates. In the table below, we present our findings on a phase basis to provide a better understanding of how the relationship between salary offers and contribution levels alter over time. Data of all treatments with voted leaders (*LP*, *LA*, *LIC*, *LAH*, *LIC* and *LCCH*) are employed and pooled OLS model with clustered standard error is used for this hypothesis.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Salary Offer	.1232807	.2459992	.202653*
	(.1256795)	(.1649971)	(.1171014)
Constant	8.742642***	9.113883***	8.89028***
	(.7343204)	(.8856141)	(.6917927)
Observations	108	108	216
R-squared	0.0064	0.024	0.0167

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, robust standard errors (clustered on groups) in parentheses.

Table 26: Pooled OLS predicting average contributions.

Before discussing our findings, we want to present results of the F-test, which is performed on the above model to test its goodness-of-fit. Since the test's F-statistic F (1, 35) = 2.99 (p < 0.1), we can confirm that our prediction model is statistical significant.

Table 26 shows that, in the first and second phase, there is no significant relationship between salary offers and group members' contributions. Across both phases, however, we find a statistical positive relationship between group members' salary offers and their contributions to the common good.

Salary offers, in our experiments, can be seen as investments that group members make for each leader. In case their favourite leadership candidates are selected as leaders, group members commit to making more contributions to the public good in order to secure their investments and expect higher returns. As a consequence, higher commitment leads to better outcomes for teamwork. According to Croson (2007), principles on rational commitment have been employed to explain individual actions in philanthropic behaviour, common pool resources and, particularly, voting.

Up to this point, some may wonder if there is an inverse connection between salary offers and group members' contributions meaning that group members exert more efforts just to pay higher salaries for the selected leader. However, participants received an written and oral instruction and therefore understand that salary offers are made before group members play the public good game. Hence, the causality should be from salary offering stage to contribution stage rather than the other way round. Moreover, provided that group members are required to make salary offers prior to knowing the final output generated from the public good game, we can reassure that the commitment to group's success of each follower is revealed by the sizes of offers they make to recruit the best leader for the group.

Based on what have been discussed, we are able to state that our hypothesis regarding the commitment to collective success of followers, who make higher salary offers in the voting stage, is supported.

Result 6: *Group members, who offer higher salaries to selected leaders, are committed to group success by contributing more to the public good.*

V. Summary and Conclusion

In our study, we want to explore the nexus between followers' happiness and leaders' performances as well as how feedback system enhances efficiency of leadership. As aforementioned, feedback is crucial for leaders to re-evaluate their own performances and develop necessary skills to accommodate new challenges (Thach, 2012). In addition, we are interested in understanding leaders' communication and its impacts on followers' satisfaction and behaviour. While communication is found to have substantial influence on increased public good (Levy et al., 2011; Oprea et al., 2014) and recover decayed cooperation between group members (Brandts, Rott and Sola, 2016), Carnevale and Isen (1986) and Oswald et al. (2015) highlight that satisfaction of subordinates positively links to collective productivity. Moreover, removal of leaders has been widely studied in politics Flores and Smith, 2011; Mesquita and Smith, 2010) but it is undermined in experimental economics. Hence, in our study, we look into the interaction between groups' outcomes and the likelihood of removing leaders. Also, as group members rate their happiness with leaders at the end of each period after observing their own incomes, we aim to investigate if followers' happiness is affected by leaders' allocation of public good. Finally, in this chapter, we want to examine group members' commitment to group success in case they are led by their favourite leaders. According to Croson (2007), commitment theories have been employed to depict and explain behaviour of individuals in public good game and, especially, voting.

Our main findings are presented as the following. We firstly discover that there is a positive relationship between group members' happiness and allocation of outputs by leaders. Secondly, we find that the worse the groups' performances are, the higher the likelihood leaders are removed at the end of each experimental phase. Thirdly, group members' happiness is found to be positively driven by third-person plural pronoun 'we', social, causal and reward-related words and negatively determined by impersonal pronouns, affect, work-related and negating words. Nevertheless, when controlling for the group's final output, followers' satisfaction is no longer affected by work-related words in leaders' abstracts. Fourthly, we explore that, in common communication treatments, function words, verbs, numbers, friendly words, affiliation-focused and risk-related words in leaders' messages positively explain variation in followers' satisfaction while comparative words, discrepancy and leisure-related words adversely explain movement of group members' happiness. In individual communication treatment, we find that members' satisfaction positively correlates

with emotional tone, affiliation and achievement-oriented words in leaders' messages and negatively relates to I-words, comparative words, power drive, focus on the past and time-related words. Fifthly, we prove that leaders, who have allocation authority and can see followers' feedback, outperform leaders with allocation authority only. Last but not least, group members, who offer higher salaries to selected leaders in the voting stage, are found to contribute more to the public good as they have stronger commitment to group success.

Before we conclude our research, we want to provide some implications for political experts, management scientists as well as applied linguistics scholars. First of all, how to survive the next political election has become one of the most important goals of any party leader. In our study, as discussed above, we find that leaders are less likely to be removed if groups' final outputs are higher. Additionally, if leaders increase provision of public good members become happier. These imply that common benefits created under one's leadership play a detrimental role to his or her re-election. Also, party leaders should make free resources more accessible to citizens with a view to obtaining loyalty from more individuals within the nation (Mesquita and Smith, 2010). It is hard to buy in voters' supports if economic benefits are not presented and embedded in manifestos of election campaigns.

Our second implication is for management studies in which improving organisational efficiency has become a long-standing target and received much attention from scientists. One of our findings suggests that groups with leaders, who are able to observe both groups' performances and feedback from group members, outperform groups with leaders, who can only see collective outcomes. This indicates that corporations should establish a valid and efficient channel for obtaining employees' happiness so that firms' executives can improve working conditions or practice proper staffing in order to help employees unleash their best potentials in assigned tasks. Fisher (2010) and Patterson et al. (2004) underscore that employees' happiness is important to organisational success as it is found that happy staffs exhibit higher efficiencies than unhappy ones. Another finding in this study indicates that if members of staff can work with their preferred leaders, they become more committed to achieving collective success by exerting more efforts on common goals. Hence, the placement of leaders into the right teams, projects or departments of the companies is decisive to organisations' productivity. This is one more time highlights the importance of a valid and efficient feedback system used in an organization as it can help top executives know about employees' psychology as well as feelings about the leaders and, subsequently, appoint suitable personnel for leading positions in the firm's teams, projects or departments.

In applied linguistics, scholars have long studied the interaction between leaders' communication and its psychological influence on message recipients or listeners. We find that, in either common or individual communication treatment, group members are generally satisfied with leaders who send more affiliated, cooperative and less comparative messages to followers. If corporate leaders want to make their employees happier and comfortable at work and, hence, more productive, they should incorporate collaborative languages in their speeches or writing. Besides,

presidential candidates can employ our discoveries in their communication with voters and supporters with a view to increasing their chances of being elected. Moreover, when it comes to differences between common and individual communication, our study provides some significant indications. If leaders have to deliver talks to large groups of audiences, our findings suggest that their communication needs to be friendly, distinctive, decisive and less leisure-focused. On the other hand, if leaders are in private discussions with subordinates or employees, their languages should convey positive emotion and achievement-orientation and be less self-focused as well as power-oriented.

Herein, we also want to discuss limitations of our study. In our experiments, participants indicate their happiness with leaders using a scale of 1 to 5 with 1 equal to the lowest happiness and 5 equal to the highest happiness. Oswald et al. (2015) employ a similar method to investigate if firms care about workers' well-being as well as demonstrate the relationship between human's happiness and human's productivity. However, such measurement may not fully reflect followers' diverse opinions on their leaders. Hence, in future researches, we expect to see a more complex measure of followers' happiness in order to obtain comprehensive understanding of what constitute satisfaction of group members and how these constituents relate to leaders' performances.

Also, our findings are generated from stylised contexts and might not represent every aspect of leadership. We, therefore, urge future studies to come up with extended experimental designs to capture other critical facets of leadership and their effects on followers as well as collective outcomes. First of all, leaders in our treatments do not contribute to the public good although they are endowed with initial wealth as group members do. The obvious extension should be to allow leaders to make contributions. Secondly, group members in our experimental designs can only see potential leaders' written abstracts. Nevertheless, there are other sources of information about leadership candidates that could have been supplied to group members prior to their offering salaries. Hence, future studies can present more information about potential leaders to group members and analyse how new information influences the choices of leaders. Furthermore, it is interesting to see if additional information changes group members' initial impressions about potential leaders as well as their satisfaction with leaders' performances.

In this chapter, we employ one-way messages sent by leaders to group members. This form of communication has been deployed in plenty of existing literature. However, there are few studies that allow two-way conversation between leaders and members. Hence, we want future researchers to apply bilateral communication to their experimental designs for the sake of making comparison with unilateral communication as well as examining the benefits of group discussion making.

Chapter 4: Leadership traits – which determine the choice of leader?

I. Introduction

For many years, importance of leadership has been a controversial topic in management, politics and even psychology. One of the most important questions, being tackled by different research fields, is whether leaders are truly critical for organisational success. Nonetheless, before a consensus can be achieved among scientists on that matter, there are still different points of view towards leaders as well as prejudices against them. In managerial and organisational studies, Bass and Bass (2008) and Hermalin (2013) highlight the attributions of leadership to group's success while Pfeffer (1977) discovers the evidence that leadership is just a sense-making process in which researchers rely on leaders' actions to explain good collective outcomes. In line with Pfeffer (1977), Staw (1975) and Calder (1977) recommend that leadership has been studied on an attributional basis rather than causal one. Consequences of inconsistent opinions on leadership impacts can lead to underdevelopment of theories and practices in executive management.

Meindl, Ehrlich and Dukerich (1985) are among the first to address conflicting views on significance of leadership and its contribution to collective success. They argue that researchers make different assumptions on leaders' influence leading to contradicting findings or spurious results. Besides, differences in applied theories and methodologies can also be a reason why there are contrasting perceptions on leadership importance and its relationship with firms' efficiency and productivity. Some studies even have improper focuses on leadership and, hence, cannot provide reliable contributions for existing literature. Last but not least, Meindl, Ehrlich and Dukerich (1985) point out that it is observers' diversion in understanding and interpreting leadership that distorts attributions of power holders to institutional performances.

Another challenge in research on leadership is that it has been confused with management over decades. Smith and Peterson (1988), Badaracco and Ellsworth (1989), and Cohen (1990) equate leaders to good managers. Jacobs (1970) and Zaleznik (1977) are among the first authors to distinguish leadership from management and followed by Hickman (1998), Weathersby (1999) and Daft (2008). In particular, Daft (2008) has provided five areas where leaders differentiate from managers and they include providing direction, aligning followers, building relationships, developing personal qualities and creating outcomes. In terms of direction, managers are in charge of scheduling plans and allocating resources to achieve those plans while leaders establish visions for organisations and develop strategies for subordinates to accomplish them. Regarding aligning followers, Daft (2008) contend that leaders communicate visions to subordinates and construct joint values and cultures within organisations whereas managers focus on directing members of staff into departments based on their expertise and closely control staffs' task execution. Building

relationships with subordinates is the third area to distinguish leaders from managers. According to Daft (2008), leadership is an influential relationship in which leaders motivate and inspire followers to perform well and achieve common goals while management is a relationship based on formal position power to order employees to work towards certain goals. In regard to personal qualities, leaders concentrate on developing emotional connection with subordinates and are willing to listen to them. Leaders are also open-minded and think outside the box. Managers, on the other hand, are those with strong expertise, having insights into organisations and requiring employees to persistently conform to standards and regulations set by companies. Finally, in terms of creating outcomes, while managers centre on achieving short-lived goals to satisfy stakeholders, especially shareholders, and maintaining efficient status quos of firms, leaders pursue longer-term objectives and make radical changes to organisations so as to enable them to deal with future challenges and expand market shares. A comparison table that summarises all five dimensions differing leadership from management is allocated in the *Appendix 2.* In this research, we want to discover constructs of efficient leadership and resolve disputes over importance of leaders to organisational outcomes.

In behavioural sciences, leadership is seen as a mediator for social inefficiency. De Cremer (2000) shows that pro-social individuals seek for leaders, especially, when they are in failure. Moreover, Yamagishi (1986) proposes three conditions needed to be satisfied at the same time before leaders are demanded. The first condition is that group members aim to accomplish and sustain mutual collaboration. The second condition is members of group realise that such cooperation can never be achieved without leadership. And, the third condition is hierarchical structure, like leader-members model, is perceived to be effective in pursuing mutual benefits. De Cremer and Knippenberg (2003) demonstrate the influence of leaders on cooperation in public good game by examining the fairness of procedures used by leaders to affect contribution levels of group members. Furthermore, especially in the field of experimental economics, leadership becomes a vibrant flow of research and there have been a large number of papers managing to underline the importance of leadership to success of organisations (Wilson and Rhodes, 1997; Moxnes and Heijden, 2003; Heijden et al., 2009; Rivas and Sutter, 2011). Besides, there is evidence that the installation of leaders into group settings (Brandts, Rott and Sola, 2016) or organisational contexts like companies and banks (McDougall, Covin and Dalton, 2002) leads to a behavioural shift in subordinates' cooperation towards sustainable efficiency. In a more recent work, Gächter and Renner (2018) document that leaders are supposed to serve as a role model for followers and shape their beliefs in others' behaviour.

Studies on characteristics of leaders are also a flourishing research area in both experimental economics and management. One of the reasons why it is becoming a trending topic is due to the rapid change in social, political, and, especially, economic landscapes that are currently affecting individuals worldwide on a frequent basis. Technological revolution 4.0 is occurring on a large scale and putting all companies in fierce competition ever seen in the history of mankind. Firms, therefore, need to identify and employ efficient leaders who are capable of uniting staffs and directing

them to sail through challenging times. Although there are a lot of studies that have been conducted on specifying characteristics of efficient leadership and linking them to collective performances, none of those researches has managed to come up with a satisfying answer to the question of what constitutes a successful leader.

Kirkpatrick et al. (2000) is among the first attempts in management to break down characteristics of effective leaders. According to them, drive, desire to drive, desire to lead, self-confidence, honesty and integrity, cognitive ability and knowledge are antecedents of an effective leader. Capowski (1994), on the other hand, identify ten essential attributes of a leader in the new era and they are comprised of vision, integrity, trust, selfishness, commitment, creative ability, toughness, communication. In empirical leadership study, House and Howell (1992) amplify the pre-eminence of charismatic leadership, which is dictated as the ability to inspire and motivate people to work harder and harder despite of obstacles (Daft, 2008). Charismatic leaders are good at emotional communication and show appealing charm to their co-workers or subordinates (Daft, 2008). Also, personality traits are proved to play a decisive role in leadership ability of each individual. Judge et al. (2002) are among most cited papers that look closely into the relationship between personalities and the ability to lead. By applying Big 5 (Costa and McCrae, 1992), which measures five different dimensions of human characteristics including extraversion, conscientiousness, openness to experience, neuroticism, and agreeableness, they highlight correlations between Big 5 facets and leadership role. Ilies, Gerhardt, and Le (2004) report positive coefficients of intelligence, emotional stability, extraversion, openness, and conscientiousness for predicting emergent leadership. Daft (2008) introduce trait approach to understanding leadership in which researchers identify common characteristics of effective leaders. The approach is also known as Great Man approach.

Howell and Frost (1989) employ experimental method to examine the effects of three different leadership styles, which are charismatic leadership, structuring leadership and considerate leadership, on individuals' performances and task satisfaction. It is found that group members, who work under charismatic leaders, have dominant performances as well as higher satisfaction with assigned tasks regardless of productivity level of groups. Gächter, Nosenzo, Renner and Sefton (2012) prove that Machiavellian leaders, who tend to act selfishly and opportunistically, contribute less to the public good when selected as leaders while Ertac and Gurdal (2012) observe a positive relationship between risk-seeking attitude and willingness to become leaders. Nevertheless, as there are diverse personality traits found in leaders of different studies, scientists wonder if there is a common formula of traits for effective leaders and if leadership is an endowed capacity or a trained one. In the current documentation, we want to address these questions and elicit key traits of efficient leadership.

Impacts of leaders on behaviour of group members and, hence, job productivity have been investigated in previous literature. Communication is deployed in our experiments because it is one of the most critical variables that affect changes in organisations and efficient in resolving coordination issues (Brandts and Cooper, 2007; Oprea et al., 2014; Brandts, Root and Sola, 2016). It is found that decayed group's

performance can be recovered and even improved if there is a leader being present in the group and communicating with other group members (Brandts et al., 2016). Chaudhuri and Paichayontvijit (2010), Levy et al. (2011), Hamman, Weber and Woon (2011), Brandts, Cooper and Weber (2015) and Nguyen and Chmura (2020) come up with a similar result as they find that non-binding messages from elected leaders, which provide suggestions on how much to contribute to the public good, have significant impact on teams' output. It is important to note that, in linguistics and psychology, communication and the language used by leaders have been well studied and become a vibrant research area. Bono and Ilies (2009) find that more than half of words used by leaders are pronouns, articles, numbers, and non-substantive words. These findings are also reported in chapter 2 of our research (Nguyen and Chmura, 2020). Collective pronouns like 'we' make listeners or message recipients feel like they are a part of the group and, hence, heighten collaboration in group (Weiss et al., 2018). First-person singular pronouns, on the other hand, help predict honesty of the speaker (Newman et al., 2003). In terms of articles, male is found to use more of this word category and Slatcher et al. (2007) highlight that US presidents are marked by their significant uses of articles in their speeches or pieces of writing.

Beside communication, a leader can set influence on her followers if s/he has redistribution authority meaning that s/he can decide how much of the public good game's output is allocated to contributors. According to French and Raven (1959) and Yukl (1989), the authority to distribute collective output is an important constituent of leadership and a vital principle of path-goal and operant conditioning approaches to leadership, which posit that the capacity to reward followers on the basis of their performances is important for leaders to be successful in motivating group members (Jago, 1982; Zhu et al., 2012; Nguyen and Chmura, 2020). Hence, in current study, we want to examine the effects of leaders with allocation authority on contribution behaviour of group members. In existing literature, Heijden et al. (2009) conduct two treatments to compare the effect of allocation authority held by leaders. In groups where final output is equally shared among members, overall performances are lower and deteriorating faster over time. In contrast, in groups where final output allocation is determined by a leader, overall performances are better and maintained at high level across periods. This is because generous contributors in groups with leaders determining output allocation receive higher shares from leaders, which in turn encourages them to donate more to the public good. In addition, free riders can no longer benefit from other members' contribution as in output-sharing treatment and, therefore, they start contributing more and hope that leaders will assign more output to them. As a consequence, overall performance of all groups with leaders having authority over common benefit is improved. Drouvelis, Nosenzo, and Sefton (2017), Stoddard et al. (2014) and Abeler et al. (2010) report similar results. However, Nosenzo and Sefton (2014) highlight that some leaders do not utilise their allocation authority and just want to keep groups' output for themselves.

Happiness of satisfaction of group members is demonstrated to have positive impacts on collective efficiency in the literature. Barsade (2002) experimentally show that positive psychology correlates with improved cooperation and performances.

Clark and Watson (1988) and Oswald et al. (2015) report similar results as they highlight that happy individuals tend to exert more efforts on jobs and exhibit higher level of productivity. According to Fisher (2010), there are different constructs of staffs' happiness at work such as job satisfaction, monetary mood, task enjoyment and intrinsic motivation. Nevertheless, there is another factor, which also contributes to the increase in followers' happiness but has not been well examined, and it is leadership ability. Dienesch and Liden (1986) assert that leadership ability influences followers' attitudes and behaviour. This assertion is in line with Ramaswami et al. (1997) as they show that supervisors' actions correlate with salespeople's trust as well as the inputs they provide in daily tasks. To extend this literature, we conjecture that effective leadership has positive impacts on followers' satisfaction at work and, in turn, drives organisational productivity upwards.

In existing literature, measurement of happiness can be either straight forward or combining multiple methods at the same time. In Oswald et al. (2015), a Likert-scale of 7 levels is employed to obtain experimental subjects' ratings of happiness. While level 1 indicates completely sad, level 7 indicates completely happy. In Barsade (2002), both self-reports and observers' ratings of mood via video tapes are simultaneously employed to elicit subjects' happiness. Barsade (2002) explains that the deployment of two different methods for measuring satisfaction provides more comprehensive results. Study of De Cremer and Kinppenberg (2003) relates to ours in the sense that it allows group members to evaluate the leaders' fairness procedures used to affect individual contributions. In specific, group members, after observing each manipulation process, are inquired how satisfied or happy they feel about leaders and their employed procedures on a scale of 1 to 7, with 1 equals to not happy at all and 7 equals to very much happy. In our experiments, at the end of each period, followers are asked to rate their satisfaction with leaders' performances on a 5-level Likert scale.

Decision to remove leaders from organisations has been investigated in a number of researches in political science. Mesquita and Smith (2010) and Flores and Smith (2011) examine the pressure of getting re-elected in the next general elections that political party leaders have to live with and its impacts on their strategies and campaign manifestos. However, in experimental economics, leadership removal is hardly learned and, thus, creates a large research gap for understanding how survival pressure alters leaders' behaviour as well as efforts made on leading organisations. Additionally, decision to remove leaders from group setting plays similar role to feedback system revealing followers' opinion about leaders' performances. According to Thach (2002), feedback is critical for leadership as it helps leaders raise awareness about their own skills and abilities and, in turn, direct them towards development and excellence in future career. Furthermore, Barro (1973) highlight that even voted leaders have incentives to behave tyrannically, so feedback can be an effective tool to remedy leaders' ill behaviour and bring them back to their expected roles and functions.

Public good game (Messick and Brewer, 1983) provides an ideal environment to detect selfish acts in institutional context and, accordingly, allows us to propose strategies to enhance cooperation between players. By design, there are four people in

each group playing public good game. Players are endowed with initial wealth denoted in tokens. As the game starts, each player has to decide how many tokens they wish to contribute to the public good. The total amount of contributed tokens is multiplied by a multiplier while, for each token retained, players earn no extra return. Owing to this property, public good game is sometimes referred to as public investment game. Game theorists predict that as human beings are selfish by instinct, they contribute little or nothing to the public good. However, experimental evidence shows the otherwise since subjects are found, on average, to donate half of their wealth to the common good (Chmura, 2018). Leader-members game is a variation of the public good game in which a group member is either voted or randomly selected as leader. His or her role is to encourage followers to contribute more to the public good and, hence, maximise economic efficiency. Heijden et al. (2009) and Drouvelis, Nosenzo and Sefton (2017) employ this setting to study the influence of leaders with allocation authority on contribution behaviour of followers. De Cremer and Knippenberg (2003) report that leaders' procedural fairness especially affects contribution level in unfavourable outcomes situation where final benefits are not equally shared among team members.

In the next section of this chapter, we present literature experimental design, data analysis, and results discussion. Through this research, we expect to provide more depth into leadership and what firms can do to improve performances of line managers, who are in direct contact with staffs and play an important role to companies' profitability. We also expect to provide human resource management with better approach to training leadership and incentivising employees of companies. By employing experimental method, we are able to study participants' behaviour through their making decision in laboratory in a series of treatments. Leaders in our study are selected as in chapter 1 (Chmura and Nguyen, 2020). Subjects are firstly randomly selected as potential leaders before observing experimental groups' salary offers and then deciding which groups they prefer to lead. This mechanism of selecting leaders offsets weaknesses of randomly selected leaders and promotes legitimacy of chosen ones (Brandts et al., 2011). Leaders, after selected, are in charge of allocating final output or communicating with other group members. Satisfaction with leaders will be rated by group members at the end of each period and revealed to leaders in some treatments. Public good game (Fehr and Gächter, 2000) is employed to design all treatments in the current study as it creates an ideal environment to study social dilemma in organisational structure.

The research questions for this chapter are stated as below:

_ What are individual traits of potential leaders that receive higher salary offers from group members in the voting stage?

_ What are key traits of successful leaders that manage to elevate collective performances of groups? Do these traits differ between male and female leaders?

_ Which traits of successful leaders do group members prefer the most and how they predict the chance of being elected of potential leaders?

II. Literature

Personality traits have been long examined as predictors for effective leadership in a vast number of studies in management, organisational behaviour and psychology. Judge and Bono (2000) correlate five factors of Big Five test with transformational leadership. While each facet of the Big Five (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism) is measured on a scale of 1 (strongly disagree) to 7 (strong agree), transformational leadership is measured by MLQ-5x, which is a new version of MLQ and contains 16 items each of which is assessed on a scale of 0 (not at all) to 4 (frequently, if not always). It is found that extraversion and agreeableness positively determine transformational leadership whereas neuroticism and conscientiousness do not have any significant relationship with this leadership style. Openness to experience is found to affect transformational leadership but its impact fades away once controlled for other personality traits in the Big Five.

Judge et al. (2002) conduct qualitative review and meta-analysis on the influence of five personality traits in Big Five test on the leadership ability. Results from this research confirm correlates of each dimension in the Big Five test with leadership. Neuroticism is the only factor that negatively relates to one's leadership ability while openness to experience, extraversion, conscientiousness and agreeableness positively drive the ability to lead. Moreover, findings from Judge et al. (2002) eliminate doubts on the reliability of Big Five traits in predicting good leaders. De Hoog et al. (2005) employ Big 5 test to draw a link between charismatic leadership and individual personalities. They document that openness to experience and neuroticism meaningfully predict charismatic leaders in dynamic environment, which is measured by three items each of which is rated on a scale of 1 (not at all) to 7 (very much so), while agreeableness and conscientiousness negatively correlate with charismatic leadership in similar context. Hogan, Curphy and Hogan (1994) review a large number of pre-existing studies on the nexus between human's personalities and leadership emergence. They manage to point out that agreeableness and emotional stability are two determinants for being perceived as leaders in group context.

Besides, individual abilities are also employed to show what one's capable of relates to his or her ability to make decisions on behalf of group members. Kickul and Neuman (2000) investigate the correlation between leadership and cognitive ability. The ability to lead is measured by two different scales by Stevens and Campion (1994) and Morris and Hackman (1969). Scores from both scales are standardised and combined into the overall indication for leadership ability. On the other hand, individuals' cognitive ability is assessed by Thurstone's Test of Mental Alertness (Thurstone and Thurstone, 1989) in which sub-tests on verbal and quantitative skills are employed. It is found that emergent leaders are those with higher scores on

cognitive ability tests. Rosete and Ciarrochi (2005) investigate the relationship between leadership effectiveness, cognitive ability and emotional intelligence (EI). To measure participants' cognitive intelligence, Rosete and Ciarrochi (2005) employ the Wechsler abbreviated scale of intelligence (WASI), which is comprised of four subtests vocabulary, block design, similarities and matrix reasoning. Besides, Mayer-Salovey-Caruso Emotional Intelligence test (MSCEIT) is applied for eliciting subjects' EI. There are 141 items in this test and they are categorised into four main areas of abilities including emotional management, emotional facilitation, emotional perception and emotional understanding (Rosete and Ciarrochi, 2005). Overall, while emotional intelligence, especially perceiving emotion capacity, is found to help distinguish between good and bad executives, cognitive ability or IQ does not have predicting power over leadership.

In experimental economics, research on what constitutes an effective leader as well as how characteristics of an individual, especially the leader, affect the group's outcome is limited and worth more studying. Paper of Howell and Frost (1989) is among a few laboratory efforts that discusses characteristics of charismatic, structuring and considerate leaders and their effects on individuals' performances in two different levels of productivity. Charismatic leadership is featured by good communication of transcendent goals and performance expectations, strong confidence in own ability and building good relationship with followers. Structuring leadership, on the other hand, is about providing guidance and organising process through role distribution and resource management. Considerate leadership, according to (Stogdill, 1974; Bass, 1981), is more effective in maintaining followers' social and psychological conditions as well as satisfaction. Howell and Frost (1989) discover that, under both levels of collective productivity, individuals led by charismatic leaders demonstrate remarkable performances while individuals led by structuring and considerate leaders only perform well in highly productive groups

Gächter, Nosenzo, Renner and Sefton (2012) measure participants' willingness to take risks and their Machiavellianism before associating those characteristics with leaders' contribution to the public good. They find that leaders who score high on Machiavellianism exhibit less cooperative behaviour while leaders' willingness to take risks is found to have no influence on their decision making process. In order to elicit subjects' risk attitudes, Gächter et al. (2012) employ the question proposed by Dohmen et al. (2011) to inquire how much risk participants are willing to take on a scale of 1 to 10 with 1 equivalent to unwilling to take risks and 10 equivalent to fully prepared to take risks. Besides, to assess one's Machiavellianism, Gächter et al. (2012) deploy psychometric test of Christie and Geis (1970). It is a 20-item test in which each item is a statement that can be phrased either in the direction of Machiavellianism or in the opposite direction of Machiavellianism. Participants have to choose their levels of agreement with each statement on a 7-level Likert scale with 1 interpreted as strongly agree and 7 interpreted as strongly disagree. The final score on Machiavellianism test is computed as the sum of all statements' scores. According to Gächter et al. (2012), higher scores on Machiavellianism signal selfishness, inclination to believe in others, and manipulativeness. Drory and Gluskinos (1980) also report

similar results on the nexus between Machiavellianism and leadership. They find that Machiavellian individuals once become leaders tend to give orders and demand assistance from subordinates in adverse circumstances

Gillet, Cartwright and van Vugt (2011) highlight that pro-social individuals are more cooperative than others in coordination games and they also express more willingness to become leaders. In their research, Gillet et al. (2011) measure one's pro-sociality by asking subjects to take a 9-item test in which each item provides three possible allocations of payoffs for subjects to choose from. Each allocation of payoffs represents either pro-sociality, competitiveness or individualism. An individual is classified as pro-socials when s/he chooses at least 6 pro-social options across nine items. Lonnqvist, Verkasalo, Walkowitz (2009) work relates to ours in the sense that it deploy Big Five personalities test to diagnose cooperative behaviour in one-shot multiple-choice prisoner's dilemma (PD) game. It is noticed that in multiple-choice PD, players have a list of potential cooperation levels to choose from and they will decide the largest possible transfers to their randomly matched co-players using the received initial endowments. It is found that neuroticism negatively predict cooperative transfers while openness to experience positively relates to cooperation. However, these findings are only found significant in hypothetical treatment where players are informed in advanced that their decisions will not determine their final payments.

As can be seen from above literature, there are a wide range of characteristics that can be attributed to effective leadership. Particularly, charismatic leadership appears to have received preferences and favourability from scientists as a dominant and efficient leading style. However, we argue that not all successful leaders are charismatic people and it is essential to have a more complete and comprehensive approach towards analysing and understanding characteristics of effective leaders in a fast-changing world like nowadays. Thus, in our research, we want to identify key attributes of good leadership that people are looking for by applying an enriched list of assessment methods and tests on personalities and capacities. Moreover, we want to generalise results from this study for human resource departments, top and line managers, and leadership training experts.

Beside individuals' personality traits and abilities, sex differences also account for variation in the ability to lead. A substantial number of studies on difference in gender and its impacts on leadership style and group's outcome have been conducted for decades. It can be seen in most of precedent papers that female leaders are found to be more risk-averse and less willing to make decisions on behalf of their groups (Ertac and Gurdal, 2012; Eagly and Karau, 2002). This finding is recorded not only in the US but also in other developed countries (Melkas and Anker, 1997). However, Appelbaum et al. (2002) show that there should be no difference in effectiveness of leadership behaviour performed by men and women. This is in line with Shimanoff and Jenkins (1991) as they prove that although there are both similarities and differences in behaviour of male and female leaders, they should be equally effective. Since there is still an on-going controversy over sex difference and its impacts on leadership efficiency, we expect to provide a deeper insight into this matter through this study.

Leaders with authorities have been studied in previous literature to examine if group members' behaviour is influenced by powerful leaders. Punishing free-riders, ostracising selfish members, and allocating group's final output are typical authorities that have been employed in previous studies. According to Heijden et al. (2009) and Drouvelis, Nosenzo and Sefton (2017), allocation power has a significant effect on improving average group contribution over time. Similarly, Stoddard, Walker and Williams (2014), by using common pool resource (CPR) game, manage to report that allocator mechanism is far more effective than tremble (resources are randomly assigned to members) and egalitarian (resources are equally shared among members) mechanisms in terms of achieving socially optimal outcomes. Allocation authority is also found to decrease free-riding phenomenon efficiently (Heijden et al., 2009). Nevertheless, such centralised system to operate rewards and incentives has some disadvantages. The first to be mentioned is that operators of those incentives and rewards may not use them in the best interest of groups to encourage cooperative acts among followers. There is evidence that leaders misuse their designated authority to make residual claimants on groups' outputs as much as they can. Nosenzo and Sefton (2014) note that some leaders do not utilise their allocation power effectively to boost teams' productivities but they are instead behave selfishly by retaining more output for themselves. One of the reasons for this inefficient behaviour is that leaders, after voted, exhibit self-entitlement and overestimate their own importance (Gaudeul and Keser, 2017; De Cremer and Van Dijk., 2005). Consequentially, they keep most of groups' output and do not distribute to group members, which in turn deteriorate collective performances over time (Nosenzo and Sefton, 2014). Another problem with delegation of rewarding power to leaders is that they sometimes do not have closed relationship with their followers and, hence underestimate the importance of uniting within-group individuals (Balliet, Mulder and van Lange, 2011).

Communication, as aforementioned, is an effective way for leaders to motivate their subordinates to contribute more to the public good. Levy et al. (2011) find that cheap talk, which is non-binding communication prior to playing public good game between group members, can increase contribution level. Hamman et al. (2011) show that groups with leaders, who send work-relevant messages to group members, outperform other groups. Moreover, leader's message is found to have strong impact on recovering decayed cooperation between group members and, therefore, increase their overall performances (Brandts, Rott, and Sola, 2016). Also, communication between leaders and group members can be in different forms such as one-way or two-way messages and face-to-face communication. Levy et al. (2011) employ free-form one-way messages in their treatments to investigate influence of leaders' communication on the cooperation and contribution of followers to the public good. Brandts and Cooper (2007) compare the effect of two-way communication with that of one-way communication on average minimum effort by firms' employees. It is found that two-way messages are more efficient than one-way messages in terms of elevating staffs' efforts contribution to companies. Also, in Ostrom et al. (1992), face-to-face communication is deployed to provide participants with an opportunity to discuss any decision problems they may have during common pool recourse

constituent game. The authors consistently find that face-to-face communication helps increase net yield significantly in both low-endowment and high-endowment groups as compared to treatments where communication is prohibited.

It is a shortcoming if we do not discuss about text analytics herein as it plays a vital role in understanding communicating languages used by leaders and associated psychological processes. Research of Pennebaker, Mehl and Niederhoffer (2003) is among most influential papers in psychology and applied linguistics that comprehensively examine the link between daily uses of words and social as well as psychological aspects. By reviewing plenty of computer programmes on analysing texts, the authors are able to highlight the important role of particles, which include pronouns, articles, prepositions, conjunctives and auxiliary verbs, in specifying one's emotional status, social identity and cognitive ability. Another interesting paper that relates to this topic is of Pennebaker and Tausczik (2010) as it introduces a powerful software package, which is called Linguistic Inquiry and Word Count 2015 (LIWC2015), for analysing and classifying words in verbal texts or recorded speeches into relevant psychological categories and how this software facilitates experimental researches on individual differences. In chapter 2, we have detailed about LIWC2015 and its build-ups.

Studies of De Cremer and Knippenberg (2003) relate to our research in the sense that they allow group members to evaluate fairness procedures deployed by exogenous leaders to increase overall performances of groups. In particular, in study 1, after making contributions to the public good for three consecutive phases, group members are informed about leaders' chosen procedures to determine followers' pro-sociality level and how group leaders allocate the contribution to each member accordingly. Prior to continuing the public good game in subsequent phases, followers are asked to indicate their evaluations on leaders' chosen procedure of fairness on a scale of 1 (very inaccurate/unfair) to 7 (very accurate/ fair) and how they are satisfied with the outcome of the game on a scale of 1 (not at all) to 7 (very much so) as well. Tyler and Caine (1981) demonstrate the significant influence of fairness in leaders' allocation procedure on evaluation of leadership. The authors investigate their hypotheses via two experiments and two surveys, which altogether return a similar conclusion on the independent impact of procedural justice on happiness of followers regardless of outcome level or outcome fairness. In the current documentation, we inquire group members to tell us how they are happy or satisfied with the group leaders by the end of each period. We are motivated by the incentive to maximise happiness of subordinates in institutional contexts as there is vast empirical literature proving the positive effect of employees' job satisfaction on collective productivity and efficiency (Erez and Isen, 2002, Fisher, 2010).

As aforementioned, we are going to obtain information about characteristics of participants to examine how individual differences explain variance in decision making process. The first and foremost test we want to discuss is Big 5 (Costa and McCrae, 1992), which assess five dimensions of individual characteristics including openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. While neuroticism refers to stability in one's emotion (Pervin, 1989; Barrick and Mount,

1991), extraversion tells how much an individual is sociable, confident, and energetic (Greenidge, 2013). Conscientiousness dictates if a person is organised, determined, purposeful, achievement-oriented, efficient, and reliable (Burger, 2008; Hofstee et al., 1992) when agreeableness reveal about cooperative spirit, consideration, and friendliness of an individual. Finally, openness to experience relates to one's imagination and creativity (Burger, 2008; John and Srivastava, 1999). In this chapter, after collecting data on participants in the experiments, we calculate the Cronbach's alphas for all dimensions of the Big Five test to investigate if it is a reliable test for eliciting individual personalities. Since the Cronbach's alphas for openness to experience, conscientiousness, extraversion, agreeableness and neuroticism equal to 0.69, 0.64, 0.64, 0.73 and 0.66, respectively, we are able to confirm that the Big Five test provides a good measure of personality traits over time because the alpha values are all larger than 0.6.

Psychopathy is described as a disorder in personality and individuals with psychopathy tend to exhibit selfishness, misleading conduct, and exploitation of other people (Lange and Osterheider, 2008). However, Harpending and Sobus (1987) suggest that psychopathy is instead a strategy for us to adapt to challenges in life. So as to assess one's psychopathy, Psychopathy Personality Inventory (Lilienfeld and Andrews, 1996) and Levenson Primary and Secondary Psychopathy Scales (Levenson, Kiehl, and Fitzpatrick, 1995) are two most popular measurements. While Psychopathy Personality Inventory (PPI) is developed from a wide range theoretical framework of psychopathy studies and includes 160 items, Levenson Primary and Secondary Psychopathy Scales has 26 items and divided into two sub-scales: (1) Primary Psychopathy (16 items) and (2) Secondary Psychopathy (10 items). Osumi and Ohira (2010) deploy both tests in their study to explain the relationship between emotion and economic decision-making process in ultimatum game. It comes as a surprise that the psychopathic is found to be rational under certain circumstances.

Cognitive ability has been found to be detrimental to leadership as it accounts for a variety of tasks that leaders have to deal with on daily basis (Carroll and Gillen, 1987). It comprises of a series of related skills such as gathering, processing and disseminating information, as well as obtaining new knowledge (Zaccaro, 2001). To measure participants' cognitive skills, in this study, we employ Cognitive Reflection Test or CRT by Frederick (2005). It is said to include testing human's judgment and decision making, which are both neglected in previous IQ tests. Results from CRT tests are found differ among sexes, time preferences, and risk preferences.

Mathematical skill may be one of the most controversial skills in leadership literature as there are different lines of thought on this particular ability. Kuhn and Weinberger (2005) find that the link between leadership and math test result is insignificant after they examine the math scores and leadership during the period of 1972-1982. Gaudeul and Keser (2017), however, apply mathematic tests for choosing leaders in public investment game. They realise that experimental participants consider mathematical ability as a relevant criterion to select leaders. Nonetheless, Gaudeul and Keser (2017) also note that individuals, after being elected as group leaders, have a tendency to keep more of the surplus generated by the group for themselves as they

overstate the importance of their decision-making role. This is known as self-entitlement phenomenon, which is raised by De Cremer and Van Dijk (2005).

Risk preferences reveal individual attitudes towards risks and can be classified as risk-seeking, risk-neutral and risk-averse. Many scientists have looked into preferences for risks as predictors for human's decisions in social dilemma. McCrimmon and Wehrung (1990) show that successful executives are more risk-seeking than any other individuals within companies. This Barnes, Reed and Jessup (2010) corroborate this finding as they prove that entrepreneurs are mostly risk takers. Ertac and Gurdal (2012) deploy the risk allocation task with six items to elicit participants' risk attitudes. Those six items are divided into individual decisions (3 items) and group decisions (3 items). Leaders are selected by a volunteer mechanism by the end of individual decisions and prior to the start of group decisions. Ertac and Gurdal (2012) find that subjects, who are inclined to make decision on behalf of other group members, are more risk-seeking than those without willingness to act as leaders. Nonetheless, some scientists report the opposite discoveries as they find evidence showing that leaders are not necessarily risk-seeking all the time. Webster (1997) recommends that entrepreneurs are not more risk-seeking than the average population. Amihud and Lev (1981) reason that as managers' incomes relate to companies' profitability, any risk related to corporate performances discourages managers from taking them.

There are two widely used measures to assess one's risk preferences and they are designed by Holt and Laury (2005) and Dohmen et al. (2011). In Holt and Laury (2011), there is a menu of ordered binary decisions each of which contains two options A and B. While A is a risky gamble, B, on the other hand, is a safe one. Experimenters can identify the extent to which an individual is risk-seeking based on the point at which s/he switches from A to B. In principle, the sooner the subject changes side, the more risk-averse that individual is. An issue with risk preferences test of Holt and Laury (2005) is that some participants switch back and forth between column A and column B or start on the wrong side of the test. Those mistakes can make it hard for researchers to interpret test results and, hence, incorrectly dictate one's risk attitudes. Jacobson and Petrie (2009) suggest using single switching point (SSP) to resolve the above problem but are criticised by Csermely and Rabas (2016) and Andersen et al. (2006), who argue that the application of SSP make the test boring and should ignore individuals' indifferences between given choices.

The second test we deploy in the current research to elicit risk preferences is of Dohmen et al. (2011). Compared to Holt and Laury (2005), this test is more straight-forward, less sophisticated and, thus, should be easier for test takers to complete. Additionally, Dohmen et al. (2011) contend that their test has several advantages over other pre-existing methods for assessing individual risk attitudes and one of them is cost-saving. Those authors argue that risk elicitation tests that involve real money at stake are too expensive to conduct and, hence, make them hard to be applied on large samples of subjects. Another advantage of Dohmen et al. (2011) test is that it produces more precise results on participants' risk attitudes while precedent methods, which deploy survey questions, are found to generate mixed findings on orientations of risks.

There is only one question in the test of Dohmen et al. (2011) and it asks test takers to indicate how they rate their own willingness to take risks on a scale of 0 to 10 with 0 equivalent to 'not at all willing to take risks' and 10 equivalent to 'very willing to take risks'. Besides proposing an original method for measuring risk preferences, Dohmen et al. (2011) also manage to demonstrate that factors like age and gender exert certain impacts on risk attitudes of people.

Ambiguity aversion discloses one's aversion to ambiguity and has been documented in various economic studies. Knight (1921) and Keynes (1921) are among earliest economists that look into decision-making process under risk and uncertainty. Later on, in the field of experimental economics, Gangadharan and Memes (2009) explore the impact of uncertainty on participant's contributions to the public and private goods. They find that uncertainty is negatively correlated with public good but positively related to private account. Dannenberg et al. (2015) also investigate the nexus between cooperation and ambiguity aversion in the context of public good game. It is found that ambiguity about game's threshold exacerbates group members' provisions for public good. Levati, Morone and Fiore (2009) report similar findings as they discover that limited information about the public good discourages group members from contributing to the common pool of resource.

To measure ambiguity aversion of participants in our experiments, we employ an ordered binary choice list with seven items each of which contain two options (Krahnen, Ockenfels and Wilde, 2013). While option A consists of risky choices with associate probabilities, option B includes uncertain payoffs with no associated probabilities. Also, option A distinguishes from B in the sense that payoffs in A vary as going down the rows while payoffs in B stay the same across choices list. It is noticed that, in ambiguity aversion test, subjects are expected to start with ambiguous choices on the right-hand side (column B) and switch to column A of risky choices on the left-hand side as they move down. The point at which subjects switch from column B to column A determines their level of aversion to ambiguity. In principle, the sooner the subject decides to change side, the more ambiguity-averse that individual is. This contrasts to risk elicitation test (Holt and Laury, 2005) in which participants' risk preferences are determined by observing the point at which they change side from column A (risky choices) to column B (safe choices).

Loss aversion is described as the feeling that losses loom larger than equivalent gains (Kahneman and Tversky, 1979; 1992). It has been employed by scientists to investigate different phenomena in management and economics. In the field of behavioural economics, one of the most influential papers on loss aversion is written by Benartzi and Thaler (1995) as they exploit the difference in individuals' perception on losses and gains to explain the equity premium puzzle. In management, Pennings and Smidts (2003) use the concept of loss aversion to examine hog farmers' buying strategies following a series of precedent documentations that discuss the effects of loss aversion on human's decision making process such as brand choices (Hardie et al., 1993), disposition effect (Odean, 1998) or orientations for cooperation (Kelley and Thibaut, 1978). In the current study, we want to learn if loss aversion predicts leadership ability as well as if it drives leaders' allocation of public good game's output.

It is also critical to investigate if make leaders are less loss averse than females ones or they are equally loss averse.

The method for measuring loss aversion of individuals bears resemblances to risk elicitation test of Holt and Laury (2005). Brink and Rankin (2013) establish a list of binary decisions with ten pairs of choices. In each decision pair, participants have to choose between options A and B, both of which include 50% chance of earning positive outcomes and 50% chance of earning negative ones. The difference between option A and option B is that negative payoffs in option A increase in sizes as subjects proceed down the rows while those in option B remain unchanged. To dictate participants' loss aversion level, researchers can identify the point at which subjects switch from column A to column B. If they change side at a higher row they are said to be more loss averse and if they change side at a lower row they are dictated to be less averse to loss.

Social value orientation (SVO) is described as a continuous measure of the level to which a person concerns for others, especially, in social dilemma. It was firstly studied by Messick and McClintock (1968) and has been attracting substantial attention from psychologists as well as behavioural scientists for the last half century. There are different research names for social value orientation including social preferences, welfare trade-off or altruism and this is because researchers have employed different measures and methods for studying social value orientation. Although there is a lexical variety in the way it is called, social value orientation is consensually agreed by scientists to be divided into altruism, pro-sociality, individualism and competitiveness. De Cremer (2000) demonstrate that people with pro-sociality are high contributors in the public good game and express concern for joint benefits and sustaining equality among individuals. Balliet et al. (2009) meta-study the correlation between social value orientation and cooperation in social dilemma and they come up with similar findings on the positive relationship between pro-sociality and cooperative behaviour.

To assess participants' social value orientation in our study, we employ method proposed by Murphy, Ackerman and Handgraaf (2011). It is a test with 15 items each of which demands subjects to choose an allocation of points between themselves and another randomly matched participants. Selection from test takers are then plugged into the below formula to compute the SVO index. According to Murphy, Ackermann and Handgraaf (2011), their method for eliciting individuals' social value orientation has some advantages over other existing methods. The first to be mentioned is that the measure is straight forward and produces a single SVO index for each subject. Also, the measure manages to preserve the transitivity of preferences chosen by test takers.

$$SVO^{o} = \arctan\left(\frac{\bar{A}_O - 50}{\bar{A}_S - 50}\right)$$

where, $\bar{A}_O$ is the mean allocation for other.

$\bar{A}_S$ is the mean allocation for self.

The SVO index, after being computed, can be classified into categories of social value orientation using the rules specified by Murphy, Ackermann and Handgraaf (2011)

- Altruism: $SVO^{o} > 57.15^{o}$
- Pro-sociality: $22.45^{o} < SVO^{o} < 57.15^{o}$
- Individualism: $-12.04^{o} < SVO^{o} < 22.45^{o}$
- Competitiveness: $SVO^{0} < -12.04^{0}$

Social intelligence is defined as the ability to precisely read social situations and choose appropriate behavioural responses to those situations (Zaccaro et al., 1991). In addition, people with high social intelligence are able to reply on either visual or verbal cues about others' emotion and feeling to predict actions (Khorashad et al. 2015). Mumford and Connelly (1991) and Zaccaro et al. (1991) state that social intelligence is an essential construct for successful leadership and plays an important part in interpreting and solving social issues. However, there are still scientists casting doubts on the determination of social intelligence to leading capacity. Follesdal and Hagtvet (2013) find that social intelligence has no predictive power of transformational leadership.

'Reading Mind in The Eyes Test' is the most popular psychometric test for eliciting individuals' social intelligence and is firstly developed by Cohen et al. (1997). The reason why it is called as above is that the test requires participants to look at photos of strangers' eyes and predict their feelings by selecting given choices of emotion-describing words. In its original design, the test has only two choices of words in each question while, in the reviewed version, Cohen et al. (2001) add two more possible choices of words to each question of the test. In the current study, we deploy the newest version of social intelligence test, which comprises 36 items. For each correct answer, subjects' scores are incremented by one and they will not have their scores subtracted in case they provide an incorrect answer. The final score on social intelligence for each participant is, therefore, equal to the sum of all correct answers they have given.

Social preferences, according to Capraro et al. (2017), can be divided into four main categories, which are spitefulness, efficiency, egalitarianism and self-interest, each category of social preferences provides different predictions about one's behaviour in social dilemma. For spiteful individuals, they tend to maximise the difference between their own payoffs and others' payoffs. In other words, they always want to have the highest benefits and others should have lowest ones. For efficient people, they have a tendency to maximise the sum of payoffs for all related parties while, for egalitarian individuals, they attempt to minimise the gap in payoffs between themselves and the others. Last but not least, self-interest refers to the one's incentive to maximise his or her own absolute payoff regardless of other's welfare. As compared to spitefulness, self-interested individuals only care about their high payoffs and do not intend to inflict harms on other parties. In existing literature, there are a number of researches on the influence of social preferences on cooperative acts and the ability to lead. Capraro et al. (2017) indicate there is positive nexus between social efficiency and cooperation while Mittal and Dorfman (2012) point out that egalitarianism is one of the

constituents of servant leadership. Spitefulness is found to have adverse impact on leadership ability and positively correlate with exploitative as well as self-entitled behaviour (Marcus et al. 2014). Also, Gillet, Cartwright and Vugt (2011) show that self-interest motive is found in individuals who are unwilling to act as leaders. In our study, we want learn about the influence of social motives on behaviour of both group members and leaders.

In order to measure individuals' social preferences, Bartling et al. (2009) introduce a binary choices list that consists of six pairs of options. In each decision, participants have to select one out of two given options each of which indicates different social motives of test takers. Furthermore, it is important to note that each choice that subjects make can indicate more than one social preferences of the tested. Similar to Capraro et al. (2017), in our experiments, we do not enforce any certain motive for any specific choice so that we can obtain a complete set of participants' motives. One of the biggest advantages of Bartling et al. (2009) test is that it is more efficient than pre-existing tools because it is straight forward and easy-to-understand. Therefore, test takers should find no difficulty completing the test.

Analytical intelligence refers to one's capacity to analyse and come up with solutions to novel issues without experiencing or learning about them in advance (Carpenter, Just and Shell, 1990). It is also called as fluid intelligence and this name originates from study of Cattell (1963), which compares analytical (or fluid) intelligence with crystallised intelligence. In Carpenter, Just and Shell (1990), crystallised intelligence is defined as the ability to judge and find solutions to problems based previously acquired knowledge or experience. There is a vast literature looking into analytical intelligence in connection with leadership ability and organisational success. McCleskey (2012) reports that analytical intelligence is one of the most critical abilities that any successful leader should possess. Also, leadership is acknowledged to be a function of analytical intelligence, leaders' behaviour and emotional intelligence (Alon and Higgins, 2005).

Raven (1962) is among the first scientists to study and measure individuals' analytical intelligence and Raven Progressive Matrices test is the outcome of his research. The test is an item-set of 36 visual questions and participants are required to select the correct answers for each question from given options**.** In our study, we employ 18 items of Raven Progressive Matrices test (Raven, 1962) to elicit subjects' analytical intelligence. For each correct answer, test takers receive one additional point while, for each incorrect answer, they will receive zero point. The final score on analytical intelligence of each experimental subject is, hence, equal to the sum of all correct answers s/he has chosen.

Machiavellianism is depicted as lack of morality, interpersonal connection and being opportunistic (Christie and Geis, 1970). Together with psychopathy and narcissism, Machiavellianism serves as a constituent of the dark triad, which is found to link to manipulative and self-centred leaders (Gillet, Cartwright and Vugt, 2011). In game theory, a number of papers have been conducted to investigate the effects of Machiavellianism on cooperative behaviour and leading capacity. Gächter et al. (2012) prove that leaders with high Machiavellianism contribute less to the public good while

Burks, Carpenter and Verhoogen (2003) report similar results on selfish behaviour of Machiavellian individuals in trust game. Drory and Gluskinos (1980) document that Machiavellian leaders are less directive and tend to give more orders. These power holders also demand support and assistance from subordinates in adverse situations more often than low Machiavellian leaders.

MACH-IV test (Christie and Geis, 1970) is a popular method for extracting information about one's Machiavellianism. It is a 20-item psychometric test in which each item is a statement that is phrased in either Machiavellian direction or non-Machiavellian direction. Participants' duty is to rate their agreement with each statement on a Likert scale of 1 to 7, with 1 equals to 'strongly agree' and 7 equals to 'strongly disagree'. When subjects agree on a statement that is in favour of Machiavellianism, their scores increase by the number they have chosen on the Likert scale. On the other hand, when subjects agree on a statement that is not in favour of Machiavellianism, their scores are deducted by the number they have chosen on the Likert scale. The final score on Machiavellianism for each participant is then computed as the sum of all scores they have selected across the test.

Leader selection process affects followers' behaviour and, hence, the overall performance of the group. There are a vast number of studies reporting the enhanced performance in public good game if there is a leader introduced to the group. In Dannenberg (2014), leaders are exogenously or randomly selected and it is found that groups contribute the most when the randomly selected leaders donate before members. This finding is in line with Moxnes and Heijden (2003). Rivas and Sutter (2009) employ endogenous leadership in their experimental study on the positive effects of voluntary leader on public good game. In comparison with groups with no leaders and groups with exogenously forced leaders, total contribution of groups with endogenous leaders is significantly higher. Voted leaders are the second form of endogenous leadership. Brandts, Cooper, and Weber (2015) propose the concept of legitimate leader, who is voted by group members. It is highlighted that voted leaders are more powerful and productive in terms of incentivising followers to exert more efforts to common tasks. In addition, Endogenous leaders are believed to be more credible and efficient than exogenous ones (Brandts, Cooper and Weber, 2015). However, Güth, Levati, Sutter, and Heijden (2007) find that there is no difference between randomly selected and voted leaders in enhancing groups' performances. In our research, we combine selecting leaders through a random process with a salary offering mechanism with a view to offsetting weaknesses of exogenous leadership and revealing preferences of groups' members for potential leaders (Nguyen and Chmura, 2020). Besides, prior to being randomly selected as potential candidates for leading positions, each experimental participant is required to write a paragraph addressing the reason why they should be chosen as group leaders. This paragraph bears resemblance to a CV that any job applicant has to submit to employers prior to interviews. Brandts, Cooper and Weber (2015) find that individuals with clear messages, which encourage cooperativeness, stand a better chance of being chosen as leaders. Also, CVs or resumes supply sufficient and reliable information about individuals and, thus, make it easier for recruitment staffs to screen for appropriate

candidates to join in interviews for available job vacancies (Arnulf, Tegner and Larssen, 2010).

The public good game (Fehr and Gächter, 2000; Messick and Brewer, 1983) is relevant to our study as it has served as an ideal environment for experimental economists to research social dilemmas and organisational problems. In addition, our study is motivated by the incentive to maximise collective productivity, so public good design should fit in our treatments. In its original format, there are four players in public good game and each of them is endowed with an initial endowment denominated in experimental currency units (ECUs). In the next stage of the game, each player has to decide how much they should contribute to the common pool of benefit. The total amount contributed is then multiplied by a multiplier of 1.5 (Ertac and Gurdal, 2012). The multiplied amount is then equally redistributed to all four players resulting in a marginal per capital return (MPCR) of 0.5. According to Davis and Holt (1993), marginal per capital return is a measure of what an individual gets back from one-unit contribution to the public good. This can lead to a conflict in the game especially when a player contributes less than others and still receive the same amount of return. In game theory, this phenomenon is known as free-riding but the explanation for such behaviour remains unclear and is demanding further studying. Fischbacher and Gächter (2010) are among a few experimental economists who attempt to provide an insight into psychological reasons behind free-riding behaviour as well as why contributions deteriorate over time. They show that the decline in contribution level over time is influenced by beliefs in others' contributions and subjects' social preferences. Specifically, since human beings are imperfect conditional co-operators, their contributions to the public good do not wholly match other group members' contributions. Coupled with the decline in beliefs in others' contributions, the outcomes of public good games are further exacerbated. Another possible explanation for the deterioration in overall contribution to the public good is due to the learning process of free riders' strategies by other group members (Fischbacher and Gächter, 2010).

Authors have employed diverse methods to resolve free-riding problem as it is considered as a toxic and socially inefficient behaviour. As mentioned above, introduction of leaders to institutional contexts emerges as a preferred solution by experts in organisational behaviour and leadership to offset negative impacts of free-riding (De Cremer, 2000). Heijden et al. (2009) prove that group with leaders, who are in charge of allocating revenues to group members, outperform groups with no leaders. Hamman et al. (2011) record similar results as they show that groups with leaders, who might communicate or might not communicate with followers, tend to have better outcomes than groups with no leaders. A simpler method that has also been employed in experimental economics to eliminate free-riding acts is giving group members the right to punish each other if they think their co-players free ride. Fehr and Schmidt (1999) find that punishment helps maintain cooperation even though it is costly to exert.

III. Experimental Design

Our experiments are based on linear public good game (Gächter and Fehr, 2000) in which four players in each group are endowed with some initial wealth denoted experimental currency units (ECUs). They then have to decide how much to contribute to the public good for which each unit donated produces a marginal per capital return (MPCR) of 0.5 (Davis and Holt, 1993) while any unit of currency retained the player earns a return of 1 (Ramalingam et al., 2016). Classic economic theory predicts that people are selfish, so they will keep everything for themselves and contribute none to the public good while experimental evidence suggests that participants donate, on average, 50% of their initial wealth to the common good (Ramalingam et al., 2016; Marwell and Ames, 1981)

Leader-followers game is variation of public good game and has been widely applied in experimental economics to investigate the impact of leadership on cooperation and collective performances in social dilemma context (Gächter and Renner, 2018; Drouvelis, Nosenzo and Sefton, 2017). In most of our treatments, except for the baseline, five random participants are selected as leadership candidates while others are formed into small groups of three. Group members, after reading written abstracts of potential leaders that dictate why they should be selected as real leaders, can make salary offers and leadership candidates decide which group they prefer to leading afterwards. In public good game stage, all group members including leaders are endowed with initial wealth and group members, but not the leaders, have to determine the amounts they are willing to donate to the common good. The final output from the game can either be redistributed to group members by group leaders or be equally shared among members depending on treatments. At the end of each period, group members are required to rate their satisfaction with group leaders and, especially, at the end of 15^{th} period, they are also asked if they want to remove their leaders. Experiments are restarted after the 15^{th} period and participants are not informed about this in advance. We believe that our design is of interest of politicians, management experts, and economists as it shows how real-world democratic institutions work and influence the provision of public benefits.

We have conducted seven treatments in total for this chapter. All of our experiments are run at the Centre for Research in Behavioural Sciences (CRIBS) of the University of Nottingham in the UK. Participants are recruited online through ORSEE (Greiner, 2015). Qualtrics (Qualtrics, Provo, UT) and z-tree (Fischbacher, 2007) are online survey tool and programming software, respectively, employed to collect data from experimental subjects. At the end of every experimental session, participants are paid in real cash using the conversion rate of 108 ECU/£. The following provides brief description of all seven treatments we have mentioned:

Treatment 1 (baseline) (*LN*): no leaders voted, 6 groups of three people playing public good game.

Treatment 2 (*LP*): potential leaders are offered with salaries but have no power after selected, 6 groups of four people play the public good game.

Treatment 3 (*LA*): potential leaders are offered with salaries, having allocation authority after selected, 6 groups of four people play the public good game.

Treatment 4 (*LCC*): potential leaders are offered with salaries, communicating with group members using common messages at the end of each period, 6 groups of four people play the public good game.

Treatment 5 (*LAH*): potential leaders are offered with salaries, having allocation authority after selected and being able to see groups' happiness levels at the end of each period, 6 groups of three people play the public good game.

Treatment 6 (*LIC*): potential leaders are offered with salaries, communicating with group members using individual messages at the end of each period, 6 groups of four people play the public good game.

Treatment 7 (*LCCH*): potential leaders are offered with salaries, communicating with group members using common messages at the end of each period, 6 groups of four people play the public good game.

Details of treatments *LN* and *LP* can be found in chapter 1. In *LA*, within each session, participants are recruited through ORSEE (Greiner, 2015), all of whom are students of different backgrounds from the University of Nottingham. They are firstly requested to complete a survey of various characteristics and personality tests such risk preferences (Holt and Laury, 2005), ambiguity aversion (Krahnen, Ockenfels, and Wilde, 2013), loss aversion (Brink and Rankin, 2013), social value orientation (Murphy, Ackerman and Handgraaf, 2011) social preferences (Bartling et al., 2009), fluid intelligence (Cohen et al., 2001), Machiavellianism (Christie and Geis, 1970), and social intelligence (Khorashad et al., 2015). All of these tests are conducted on online platform of Qualtrics (Qualtrics, Provo, UT). Next, participants continues to taking another four tests in z-tree (Fischbacher, 2007), which are Big 5 personality test (Costa and McCrae, 1992), psychopathy test (Levenson, Kiehl, and Fitzpatrick, 1995), cognitive reflection test (Frederick, 2005), and mathematic test (Gaudeul and Keser, 2017). Then, all participants are provided with instructions on public good game and required to write a short paragraph telling if they want to become a leader and why they should be selected as leader. In the following stage, computers randomly select five individuals to become potential leaders while other nine people are assigned to small of groups of three. In the next stage, group members have chance to read all written abstracts of leadership candidates to obtain a better insight into these individuals. As the experiment continues, group members now have an opportunity to offer salaries to potential leaders with a view to recruiting the best leaders for their groups. Abstracts are again shown to group members. Since group members have read instructions on the public good game in an earlier stage, they completely understand the importance of leaders and, hence, have motivation to select the best leaders possible. After all salary offers are submitted, each potential leader can observe them and make decisions on which groups to lead. As there are only three groups while there are up to

five leadership candidates, two potential leaders stop the experiment temporarily after this stage. Once all groups are completely formed, they proceed to public good game and each participant is endowed with an initial wealth of 20 ECUs. Group members have to decide how much they wish to contribute to the public good. It is noticed that although leaders are also endowed with experimental money, they do not contribute anything in this game. The total contribution of each group is multiplied by the selected multiplier of 1.5 (Ertac and Gurdal, 2012) and the final output is presented to group leaders in the next stage. Leaders not only can see their groups' performances, they also observe the contribution levels of all followers. Leaders then decide how much they want to allocate to each group member. Once leaders have made their allocation decisions, in the next stage of our experiment, group members can see their profits for the current period as well as the overall performances of their groups. Earnings of group members in allocation treatments (*Figure 8*) are calculated as the following:

$$w_j = a - L_{i,j} + b_j$$

where, w_j: the earnings (in percentage of final output) for group member j (j=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary (in percentage of final output) for leader i (i=1, 2, 3, 4, 5) by group member j (j=1, 2, 3).

b_j: allocated amount (in percentage of final output) for group member j (j = 1, 2, 3) determined by the leader.

Additionally, group members are also asked to provide their satisfaction with leaders' performances by rating their happiness on a scale of 1 to 5 with 1 equal to lowest happiness and 5 equal to highest happiness. Leaders can also see the information about their profits, but are not asked to perform any further activity. It is noticed that profits earned by leaders in allocation treatments are calculated using the formula below:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3} + (p - b_{i,1} - b_{i,2} - b_{i,3})$$

where, w_{Li}: the earnings (in percentage of final output) for leader i.

$L_{i,j}$: the salary offer (in percentage of final output) made to leader i by member j. Noted that $L_{i,j}$ lies within [0,a], where $\boldsymbol{a}$ is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

p: group's remaining output (in percentage) after paying $\boldsymbol{a}$.

$b_{i,j}$: allocation amount to member j of group led by leader i.

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

The experiment returns to public good game stage after this stage. All participants repeat playing public good game for at least 14 more periods. At the end

of 15th period, group members are also questioned if they want to remove or keep their group leaders. In case they want to sack their leaders, group members are then asked who they want to choose as the new leaders. We also supply the written abstracts of all leadership candidates again in this stage. Afterwards, there is a game restart without participants' notices.

In *LAH*, shown in the *Figure 8*, most of the stages are similar to *LA*. However, in *LAH*, after all group members rate their happiness, the experiment continues as the leader observes the average happiness level of followers before everybody in the group starts the new period from the public good game stage. As 15 periods end, the experiment restarts without informing participants in advance. Nevertheless, prior to the start of the second phase, group members in each group are required to decide if they want to keep or change their leaders and if they want to change who they expect to be their next leaders. To facilitate followers' decision-making process, we reshow all introductory paragraphs written by potential leaders.

It can be seen from the below flow chart that the first six stages of treatments *LCC*, *LIC* and *LCCH* are similar to those of *LA*. However, in stage 7 and 8, treatments *LCC*, *LIC* and *LCCH* proceed differently from *LA*. In addition, between treatments *LCC*, *LIC* and *LCCH*, they proceed differently from each other as well in stages 7 and 8. In *LCC*, after finishing the public good game, group members and leaders in *LCC* can observe their groups' performances as well their individual profits for the current period. Formula to compute group members' profits in communication treatments (*Figure 8*) is presented as below:

$$w_j = a - L_{i,j} + p/3$$

where, w_j: the earnings (in percentage of final output) for group member j (j=1, 2, 3).

a: an exogenous variable (in percentage) and has a maximum value of 10% of the group's final output.

$L_{i,j}$: the offered salary (in percentage of final output) for leader i (i=1, 2, 3, 4, 5) by group member j (j=1, 2, 3).

p: group's remaining output (in percentage) after paying ***a***.

while leaders' profits are computed as:

$$w_{Li} = L_{i,1} + L_{i,2} + L_{i,3}$$

where, w_{Li}: the earnings (in percentage of final output) for leader *i.*

$L_{i,j}$: the offer (in percentage of final output) made to leader i by member j. Noted that $L_{i,j}$ lies within [0,a], where ***a*** is an exogenous component (in percentage) *and has maximum value of 10% of the final output.*

i={1, 2, 3, 4, 5}.

j={1, 2, 3}.

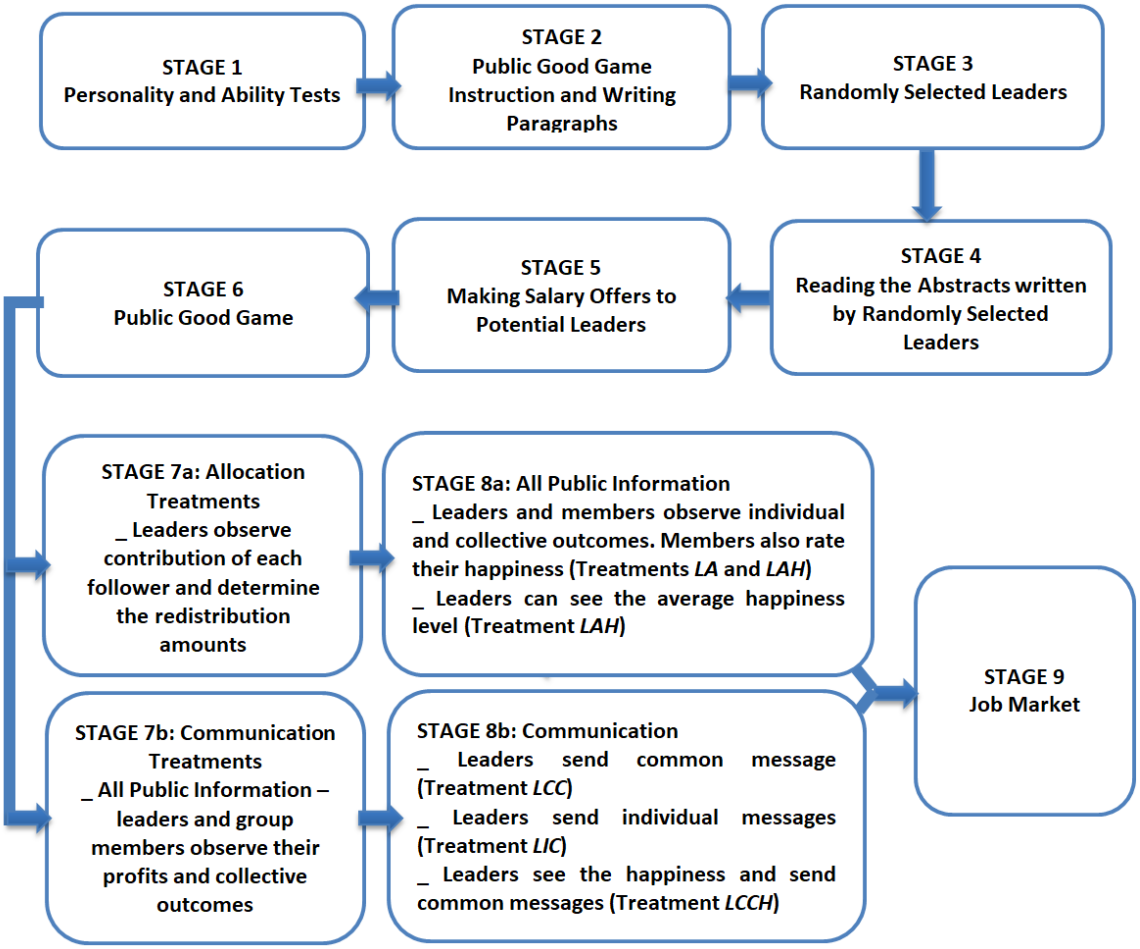


Figure 8: Flow chart of stages in treatments *LP*, *LA*, *LCC*, *LAH*, *LIC* and *LCCH*.

Besides observing their own profits and collective performances, group members also provide their happiness or satisfaction with group leaders' performances. In stage 8, leaders of *LCC* send out common messages to their group members with a view to incentivising followers to make higher contributions. Afterwards, these common messages are displayed to group members before the experiment starts a new period. Such process is repeated for another 14 periods after which the experiment restarts without participants' notices. However, before the game restarts, group members have chance to tell whether they want to remove their leaders and select new ones. The abstracts of all leaders are again shown to remind followers about each leadership candidate.

In *LCCH*, leaders and group members are able to observe their periodic profits and groups' collective performances in stage 7. Also, at this stage, group members are inquired about their satisfaction with leaders' performances. Then, in stage 8, each leader composes a common message and sends it to three group members. After followers have already read the common message sent by their leader, the experiment continues by letting the group leader see the group's average happiness level. Once

this stage ends, the experiment returns to public good game stage and a new period begins. Especially, in the 15th period, after leaders observe their groups' happiness levels, the experiment continues as group members have to indicate whether they want to keep or remove their current leaders. In case they want to change leaders, a list of all leaders' abstracts is displayed to help followers find it easier to select new leaders.

LIC differs from *LCC* in only one aspect, which is the type of message composed. If leaders in *LCC* write one single message towards the end of each period and send it to all group members, in stage 8, each leader of *LIC* has to compose three different messages and send them to three followers. Depending on the contribution level of each group member as well as group's performance within the current period, the content of each message may vary. Group members are provided with a certain amount of time to read their own messages before the experiment returns to public good game stage. Players of this treatment have to repeat public good game for at least 15 periods before the game restarts. In the 15th period, similar to treatments *LCC* and *LCCH*, group members are asked if they want to remove or keep their leaders. In case they want to remove their leaders, they need to indicate which other candidates they prefer to select as the new group leaders. Abstract of each potential leader is displayed again so as to help group members recall all leadership candidates.

Based on our experimental design, research hypotheses for the current study are discussed and presented as the following. Firstly, we want to identify characteristics of a leadership candidate that can determine his or her salary offer. Risk-seeking and social intelligence are found to have positive relationship with leadership ability (McCrimmon and Wehrung, 1990; Zaccaro et al., 1991). Hence, the first hypothesis is as below:

Hypothesis 1: *Leaders, who are risk-taking and socially intelligent, receive higher offers from group members.*

In the second hypothesis, we focus on eliciting key traits of effective leaders. Judge et al. (2002) correlate five dimensions of Big 5 test with leadership while Gächter et al. (2012) show that Machiavellianism is adversely related to leaders' contribution to the public good as well as their leading capacity.

Hypothesis 2: *Groups with leaders scoring low on openness to experience, neuroticism and Machiavellianism outperform other groups.*

The third hypothesis examines the influence of key traits of effective leaders on followers' satisfaction. We define strong leadership as having higher score on characteristics specified in hypothesis 2 of this chapter. In existing literature, Howell and Frost (1989) experimentally study the relationship between leading styles and satisfaction of subordinates while Tyler and Caine (1991) demonstrate the reliance of followers' evaluation on leaders' fairness in allocation behaviour.

Hypothesis 3: *Leaders with strong leadership traits score higher on group members' satisfaction scale.*

In the fourth hypothesis, we want to see whether there are differences in effective leadership traits between males and females. Mittal and Dorfman (2012) find that ambiguity seeking and egalitarianism are components of servant leadership while Steininger and Eisenberg (1976) report that males are more Machiavellian than females.

Hypothesis 4: *Male leaders are more ambiguity seeking, egalitarian, neurotic and Machiavellian than female leaders.*

Finally, the hypothesis 5 is designated for studying the link between effective leadership traits and selection of leaders. We conjecture that if potential leaders scoring high on key traits of effective leadership, which are identified in hypothesis 2 of this chapter, they are more likely to be chosen as group leaders.

Hypothesis 5: *Leaders with stronger leadership traits have higher likelihood to be re-elected.*

IV. Data Analysis and Discussion

1. Leadership traits and Group's salary offers

Hypothesis 1: *Leaders, who are risk-taking and socially intelligent, receive higher offers from group members.*

Given the fact that group members are diverse in their backgrounds, they have different preferences over leadership styles and, hence, offer different salaries to potential leaders. For example, while some members prefer leaders with good mathematic skills (Gaudeul and Keser, 2017), other followers look for an extrovert, open to experience and conscientious leader (Judge et al., 2002). In this hypothesis, we want to investigate the interaction between traits of selected leaders, which are elicited in stage 1 of our experiments, and the amount of salaries they are offered in the voting stage.

We initially calculate the average salary offer for each leader in the first phase, second phase and both phases. Next, we regress these calculated values on the personality and ability traits of selected leaders. Results of this regression are shown in the table below in different time spans. Data of treatments *LP*, *LA*, *LCC*, *LAH*, *LIC* and *LCCH* is employed for this hypothesis.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Neuroticism	-2.886732*	-1.630914	-1.726233*
	(1.424314)	(1.577719)	(.9493209)
Openness to Experience	-4.299888***	-3.945015**	-3.492495***
	(1.239676)	(1.607988)	(.9506665)
Loss aversion	.5415794*	.3096518	.3539652*
	(.2708456)	(.3318582)	(.2062372)
Machiavellianism	-3.056064**	-.2935513	-1.34758
	(1.391256)	(1.853275)	(1.118374)
Self-esteem	---	1.514663*	1.060733**
		(.8263298)	(.5006344)
Constant	48.15202***	15.13246	19.39931***
	(13.44515)	(10.60644)	(6.539643)
Observations	36	36	72
Adjusted R-squared	0.2243	0.1250	0.1913

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 27: Pooled OLS regression predicting average salary offers to selected leaders.

Before discussing the results on the relationship between selected leaders' characteristics and the amounts of salary offers they receive in the voting stage, we want to notice that an F-test is also conducted on the regression model for all periods (1-30) to test its overall significance. Since the test's F-statistic is equivalent to 3.80 (p-value < 0.01), we are able to conclude that the regression coefficients are jointly different from zero and, hence, the model has some predictive power.

As can be seen from the regression table, openness to experience of Big Five personality test is found to be negatively correlated with offers to leaders across all time spans. While it provides a good prediction for individual originality and creativity (Judge and Bono, 2000), there is a lack of evidence on the effect of openness to experience on leadership ability. In addition, Judge and Bono (2000) find equivocal result on the nexus between leadership and openness to experience. In the current study, we conjecture that group members neglect or disregard the importance of openness to experience when selecting leaders in the voting stage and, hence, offer fewer salaries to those with high level of this characteristic.

Table 27 shows that neuroticism and Machiavellianism are both negatively related to average salary offers to leaders in the first phase but their effects disappear in the second phase. Throughout thirty periods, neuroticism is found to negatively drive salary offers to leaders. Self-esteem is statistically correlated with leaders' salary offers in the second phase and across both phases.

Neuroticism and Machiavellianism have been widely studied in relation to leadership ability. There is vast literature showing the negative impacts of these two characteristics on leadership (Judge et al., 2002; Gächter et al., 2012). Hence, our findings on these two facets of leadership traits are supported and we infer that group members, in the first experimental phase, screen for leaders who are less emotionally unstable, having tendency of depression and exploitative. Self-esteem, according to Hill and Ritchie (1977), is a subjective self-evaluation on how an individual feels about his own competence, confidence, strengths and weaknesses. It also indicates the degree to which one believes in his success and worthiness. There is a stream in the literature highlighting the relationship between self-esteem, productive functioning, locus of control and, hence leadership effectiveness. Hill and Richie (1977) review a large number of papers on individual productivity to confirm the significant nexus between self-esteem, indicated by the level of self-confidence, and the ability to lead. Deci and Ryan (1985) contend that there is a positive relationship between high self-esteem and personal sense for locus of control, which is defined by House and Howell (1992) as one's belief that his own acts determine what happens to him rather than other forces. It is noticed that locus of control is demonstrated in various studies to strongly relate to leadership ability and job performances (House and Howell, 1992; Patterson et al., 2004). In the second phase of our experiments, offers to leaders are proved to be positively driven by self-esteem and no longer negatively affected by Machiavellianism or neuroticism. However, based on what have been discussed about self-esteem, we have a reason to believe that this change is just the interplay between individual characteristics. In other words, a positive relationship between salary offers and leaders' self-esteem is similar to a negative relationship between salary offers and

leaders' neuroticism or Machiavellianism. Group members, in the second half of experiments, still look for leadership candidates with emotional stability, confidence and not exploiting other people. Our explanation is backed by McCrae and Costa (1992) and Bass (1990) as they consistently document an opposite interaction between neuroticism and self-esteem while Rauthmann (2012) and Valentine and Fleischman (2003) find an adverse connection between Machiavellianism and self-esteem.

Regarding loss aversion, Tversky and Kahneman (1992) define it as a prospect to assign more weight on losses than on comparable gains. According to Everett, Faber and Crockett (2015), since making a loss looms larger than making equivalent gains, people are likely to help each other avoid harmful outcomes. This is among a few studies that show the relationship between aversion to loss and its impact on collective behaviour. In the first 15 periods, as group members prefer leadership candidates with higher loss aversion, we hypothesise that they are afraid of loss and expect the chosen leaders to help them avoid making losses during public good game. In the second phase, however, loss aversion's positive effect on followers' salary offers weakens and vanishes. We conjecture that, after the first phase, group members are eventually not happy or satisfied with highly loss-averse leaders' performances. Hence, as the game restarts, they do not consider loss aversion as a determining factor for selecting leaders anymore. Consequentially, aversion to loss becomes insignificant influencer on the amounts of salaries that potential leaders can possibly receive from group members. In the *Table 28* below, we apply U-test on the group happiness level to compare average satisfaction between groups led by more loss averse and less loss-averse leaders. Statistics on satisfaction level is also displayed.

	Observations	**Periods 1-15**
Average happiness with less loss-averse leaders	29	3.099462 (.8449697)
Average happiness with more loss-averse leaders	7	2.666666 (1.112)
p-value		0.3684

Notes: p-value is based on Mann-Whitney rank-sum test (U-test), ***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard deviations in parentheses.

Table 28: Comparison of average happiness among groups led by more loss-averse and less loss-averse leaders.

We define more loss-averse leaders as those with lower–than-average scores in the Brink and Rankin test (2013) and less risk-averse leaders as those with higher-than-average scores in the same test. As can be seen from the *Table 28*, average happiness for more loss-averse leaders is statistically indifferent from average happiness for less loss-averse leaders (*p-value = 0.3684*). In addition, the mean happiness of all groups led by more loss-averse leaders ($\mu = 2.67$) is even lower than the mean happiness of all

groups led by less loss-averse leaders ($\mu = 3.10$). Therefore, we can assert that high loss-averse leaders, after selected in the first phase, do not make much difference from low loss-averse leaders in terms of satisfying group members.

In general, average salary offer is found to be adversely driven by openness to experience and neuroticism and positively determined by loss aversion and self-esteem. We, therefore, conclude that leaders with lower levels of openness to experience and neuroticism and higher scores on self-esteem and loss aversion receive higher offers than other leaders.

Result 1: *Group members offer higher salaries to leaders, who score less on neuroticism and openness to experience and high on self-esteem and loss aversion.*

2. Leadership traits and Group's performance

Hypothesis 2: *Groups with leaders scoring low on openness to experience, neuroticism and Machiavellianism outperform other groups.*

In this section, we want to continue our findings in hypothesis 1 and identify traits of an efficient leader. We, therefore, investigate the interaction between the performance of each group and the characteristics discovered in previous hypothesis. Results from this section can help answer a long-standing question in leadership studies on determinants of a good leader. We also want to bring consensus to arguments on the importance of leadership and facilitate the development of leadership theories.

We firstly compute the average performances of groups in treatments *LP*, *LA*, *LCC*, *LAH*, *LIC* and *LCCH* for the first 15 periods, second 15 periods as well as for 30 periods. Then, we regress these values on the personalities and abilities of each leader. Regression results are presented below (*Table 29*) and reported in three different time spans to provide a closer look at the interaction between dependent and independent variables across experimental phases.

As can be seen from the table below, average groups' performances are consistently positively driven by leaders' egalitarianism and their ambiguity seeking. Machiavellianism and neuroticism are found to negatively influence groups' performances in the first phase and throughout 30 periods, but their effects are weakened and become insignificant in the second phase. Leaders' individualism, on the other hand, is proved to positively affect groups' performances in the second 15 periods only.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Neuroticism	-5.600058**	-4.46739	-4.257013*
	(2.321497)	(3.636013)	(2.205257)
Egalitarianism	3.558773***	3.095312*	3.191818***
	(1.150868)	(1.664442)	(1.054782)
Ambiguity Seeking	1.925553**	3.316155**	2.386411***
	(.7556431)	(1.284863)	(.7488127)
Machiavellianism	-9.997462***	-.568141	-5.503934**
	(2.799825)	(3.98653)	(2.477191)
Individualism	---	9.268184**	3.860831
		(3.98278)	(2.50098)
Constant	65.75518***	16.86893	33.80085***
	(14.96581)	(18.01994)	(11.05291)
Observations	36	36	72
Adjusted R-squared	0.3336	0.2564	0.2169

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 29: Pooled OLS regression predicting group's performance.

As aforementioned, while Judge et al. (2002) demonstrate the negative impact of neuroticism on leadership, Gächter et al (2012) show that Machiavellianism deteriorates one's leading capacity. Egalitarianism is defined as the preference to minimise inequality between parties (Capraro et al., 2017). Also, Mittal and Dorfman (2012) highlight egalitarianism is one of the five dimensions of servant leadership. In our study, we conjecture that leaders with high egalitarianism pay close attention to followers' performances and reward or incentivise group members on a fairly basis, which in turn elevates collective outcomes as a whole. In allocation treatments, leaders are hypothesised to make high allocations to reward good performers and low allocations to poor performers as well as free-riders. In communication treatments, leaders are assumed to send complimentary messages to high contributors while composing encouraging texts for low contributors with a view to minimizing differences in donations between group members and, therefore, their final profits. Mittal and Dorfman (2012) also find that the culture of uncertainty avoidance or ambiguity aversion is negatively correlated with egalitarianism and, hence, servant leadership values. This is in line with our finding on the relationship between ambiguity seeking and collective performance.

Individualism is one of four categories of social value orientation and characterised by independence, uniqueness and self-orientation (Elias, 2015). People with individualism tend to act on their own and do not rely on others for material benefits (Carlisle and Smith, 2005). In more extreme points of view, some scientists

criticise individualistic people for behaving selfishly and setting their courses of actions to serve their own good (Kuchinke, 1999). There is evidence, however, supporting the productivity and cooperativeness of individualists. Waterman (1981) points out that negative assertions on individualism in pre-existing studies are derived from a conceptualization of individualism that is different from the one used by psychologists in practice. By employing principles proposed by advocates of individualism in psychology, he shows that individualistic persons facilitate efficiency and collaborative behaviour. More surprisingly, individualists are highlighted to relatively act in an egalitarian manner (Carlisle and Smith, 2005). In leadership literature, there is little evidence on the impacts of individualism on the ability to lead while there are mixed findings on the role of this characteristic on cooperation. Astin and Astin (2000) argue that academic faculty members with individualistic leadership, which is featured by personal status and professional recognition, are the driving factor for appropriate research. Kuchinke (1999) find that individualism is one of three strongest predictors for charisma in leadership. In our study, in the second phase of the experiments, we find that individualism, coupled with egalitarianism and ambiguity-seeking, play an important role to groups' performances. We posit that leaders with higher individualism in the second phase are more effective than non-individualistic leaders. However, the influence of individualism on collective performances is temporal because we do not find its significant impact of groups' performances beyond the second phase of experiments.

Throughout 30 periods, there are four main drivers of groups' performances including neuroticism, egalitarianism, ambiguity seeking and Machiavellianism the distribution of which are provided in *Appendix 8*. Thus, we conclude that leaders with a strong sense for equality, ambiguity seeking and lower level of neuroticism as well as Machiavellianism are efficient ones, who can help elevate collective performance in organisational structure. An F-test is also conducted to confirm the overall significance of our findings. In specific, we find an F-statistic of 4.93 (p-value < 0.001), so we can conclude that coefficients on explanatory variables for groups' performances are simultaneously different from zero.

Herein, we also want to provide a table of rankings of average contributions by treatments with a view to comparing performances of leaders in different treatments (*Table 30*).

Rankings	Treatments	Rankings by Average Contributions	Rankings by Average Payoffs
1	*LAH*	33.65604	22.75154
2	*LIC*	32.48743	23.41407
3	*LCCH*	29.87611	22.66195
4	*LP*	27.26626	22.90633
5	*LCC*	26.88177	22.63236
6	*LA*	24.18259	22.37246

Table 30: Rankings of Leadership Treatments by Average Contribution.

As can be seen from the table above, leaders in *LAH* are the most efficient ones as their groups are ranked number one in terms of average contribution on the ranking list while leaders, who communicate with group members through individual messages (*LIC*), are the second most effective ones. Leaders in *LA* are the most inefficient ones as they are seventh ranked in the above table. By applying the U-test, we manage to find that leaders in *LAH* are statistically more ambiguity seeking ($n = 6, p < 0.1$) and less neurotic ($n = 6, p < 0.1$) than leaders in *LIC*. This is in line with our findings above regarding the relationship between groups' performances and leaders' neuroticism and ambiguity-seeking. However, average payoffs in *LIC* are found to be statistically larger than those in *LAH* ($n = 12$, $p < 0.1$). One of the reasons for this is *LAH's* leaders employ allocation authority to punish free riders and low contributors. Hence, the produced output from the public good game is not always fully distributed out.

Between *LAH* and *LA*, we have discussed in chapter 3 that one of the reasons why leaders in *LA* are inefficient is because they cannot observe the happiness level of group members at the end of each period and, hence, their allocation behaviour is less effective than *LAH* leaders' (Nguyen and Chmura, 2020). In addition, by applying U-test on retention ratio, we manage to show that there is a statistical difference in the retained output between leaders in *LA* and leaders in *LAH* ($n = 179, p < 0.001$). In particular, leaders in *LA* retain more groups' output (44.08% of final output) than leaders in *LAH* (38.15% of final output). This implies that *LA*'s leaders are less egalitarian than their counterparts in *LAH.* Also, we manage to prove that leaders in *LA* are more neurotic and less ambiguity-seeking than those in *LAH* by employing the U-test ($n = 179, p < 0.0001, p < 0.0001$, *respectively*), which in turn explains the selfish behaviour of *LA*'s leaders.

In terms of *LIC* and *LA*, we find statistical differences in average contribution ($n = 12$, $p < 0.1$) and average payoff ($n = 12$, $p < 0.001$) between those two treatments although we find no differences in neuroticism, Machiavellianism and ambiguity-seeking between leaders in *LIC* and *LA*. Leaders in *LA*, as discussed above, tend to keep more collective output for themselves rather than distribute it to group members resulting in less cooperation from group members. On the other hand, final output in *LIC* is equally shared among members and leader only receive his or her offered salary, which is expressed as percentage of the group's final output. Hence, both group members and leaders in *LIC* have incentive to work harder to elevate the collective output.

In *Appendix 7,* we plot a graph of average contributions and another graph of average payoffs for all leadership treatments in order to supply a better picture of productivity across time spans. In addition, we insert tables of rankings of groups by average contributions in each treatment and between treatments. It is noticed that, for each treatment, the average values on contribution and payoff are calculated as the average of all six independent groups' contributions and payoffs, respectively.

Result 2: *Leaders, who score low on neuroticism, Machiavellianism and high on egalitarianism, ambiguity seeking, are more efficient in terms of elevating common performances.*

3. Group's satisfaction and leadership traits

Hypothesis 3: *Leaders with strong leadership traits score higher on group members' satisfaction scale.*

This hypothesis is a continuation of hypothesis 2. We have seen that leaders with high egalitarianism, ambiguity seeking and low neuroticism, Machiavellianism enhance collective efficiency. Hence, we want to investigate if group members are more satisfied with those leaders and whether we can obtain significant evidence on the relationship between leadership traits and subordinates' happiness. Although there has been a vast literature in management, economics and psychology examining the nexus between employees' happiness and job outcomes, there is little evidence on the causal link between leaders' personality traits and their followers' satisfaction.

In the current hypothesis, we reuse all traits that have been identified as characteristics of efficient leaders specified in hypothesis 2. We also compute the average happiness of group members for each selected leader. Then, we run pooled OLS regression to determine the interaction between leaders' characteristics and groups' happiness. Similar to previous hypothesis, we present our findings in three different time spans as the following:

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Neuroticism	-.2612048	-.1134379	-.1880383
	(.2590557)	(.2655591)	(.1770191)
Machiavellianism	-.8008688**	-.9281859***	-.8763291***
	(.3086855)	(.2883668)	(.2011628)
Egalitarianism	.1725363	.273205**	.2332111***
	(.1304842)	(.1183238)	(.083599)
Ambiguity Seeking	.0714599	.0859149	.0885205
	(.0838624)	(.0933699)	(.0597597)
Constant	4.97338***	4.410316***	4.960118***
	(1.239217)	(1.246708)	(.8613595)
Observations	36	36	72
Adjusted R-squared	0.0874	0.2291	0.2098

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, standard errors in parentheses.

Table 31: Pooled OLS regression predicting group's happiness.

We start our discussion about regression results by reporting predictors for group members' happiness across both phases (periods 1-30). While Machiavellianism is negatively correlated with group members' happiness, egalitarianism positively determines the satisfaction level of followers. An F-test is also performed on the model

for predicting group members' happiness throughout 30 periods to check if its coefficients are overall significance. Since the test's F-statistic is equal to 4.77 (p-value < 0.001), we confirm the statistical significance our findings. Additionally, directions of relationships between groups' happiness and explanatory variables are supported by existing literature. Egalitarianism is found by (Mittal and Dorfman, 2012) to be one of components of leadership while Machiavellianism is proved to have adverse effect on leadership ability (Gächter et al., 2012; Drory and Gluskinos, 1980).

Splitting our data into two experimental phases permits us to make comparison on changes in determinants of followers' satisfaction. It can be seen from the table above that groups' happiness negatively correlates with Machiavellianism in the first and second 15 periods and is positively related to egalitarianism in the second 15 periods. A larger absolute value of coefficients on Machiavellianism in the second phase, as compared to the first phase, suggests that leaders' with lower scores on this characteristic are even more preferred by group members. In addition, a positive link of egalitarianism with group members' happiness signals that group members, in the second phase, also prefer leaders upholding equality.

As mentioned earlier, overall, average happiness of each group is positively determined by egalitarianism and negatively driven by Machiavellianism. This allows us to state that efficient leaders' characteristics, which have been identified in hypothesis 2 above, more or less determine the happiness or satisfaction of followers.

Result 3: *Leaders with higher scores on egalitarianism and lower scores on Machiavellianism are more preferred by group members.*

4. Leadership traits and genders

Hypothesis 4: *Male leaders are more ambiguity seeking, egalitarian, neurotic and Machiavellian than female leaders.*

Up to this stage, we have identified key traits of efficient leaders, which are more egalitarianism, ambiguity seeking and less neuroticism, Machiavellianism. In this hypothesis, we want to deeper investigate how leadership traits relate to genders. There is vast literature on leadership having looked at differences in leading capacity between males and females. However, results are inconclusive and require further studies.

In order to achieve research aims of the current hypothesis, we apply multivariate analysis of variance (MANOVA) with significance level of 10% or 0.1 on identified leadership traits and genders of selected leaders. This is because we have more than one dependent variable and only one explanatory variable. In addition, while dependent variables are continuous ones, their predictor is a categorical variable with 0 equal to female and 1 equal to male. Results from MANOVA tell us if there are differences in leadership traits between males and females. Four statistics are commonly employed in MANOVA to test against the null hypothesis of are Wilk's lambda (W), Pillai's trace (P), Lawley-Hotelling (L) trace and Roy's largest Root (R). Each

of these statistics has its own strengths and weaknesses and, therefore, we reply on four statistics to draw final conclusion on multivariate effect. In case there is any conflict between multivariate test statistics, we follow procedures of Rencher (2001) to deal with the issue. Firstly, we need to examine the eigenvalues and covariance matrices. Then we attempt to assess the nature of the conflict in light of properties of relevant tests.

Source	Statistic	df	F(df1,	df2)	=	F
Gender	W 0.8233	1	3.0	32.0		2.29*
	P 0.1767		3.0	32.0		2.29*
	L 0.2147		3.0	32.0		2.29*
	R 0.2147		3.0	32.0		2.29*
Observations		36				
Residual		34				
Total		35				

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 32: Multivariate Analysis of Variance (MANOVA) on leadership traits (egalitarianism, ambiguity seeking and Machiavellianism) in the first 15 periods.

Source	Statistic	df	F(df1,	df2)	=	F
Gender	W 0.7876	1	3.0	32.0		2.88*
	P 0.2124		3.0	32.0		2.88*
	L 0.2697		3.0	32.0		2.88*
	R 0.2697		3.0	32.0		2.88*
Observations		36				
Residual		34				
Total		35				

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 33: Multivariate Analysis of Variance (MANOVA) on leadership traits (egalitarianism, ambiguity seeking and Machiavellianism) in the second 15 periods.

Source	Statistic	df	F(df1,	df2)	=	F
Gender	W 0.8072	1	3.0	68.0		5.41***
	P 0.1928		3.0	68.0		5.41***
	L 0.2389		3.0	68.0		5.41***
	R 0.2389		3.0	68.0		5.41***
Observations		72				
Residual		70				
Total		71				

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 34: Multivariate Analysis of Variance (MANOVA) on leadership traits (egalitarianism, ambiguity seeking and Machiavellianism) across both phases.

As can be seen from three tables above, there are significant multivariate effects in the first phase ($F (3, 32) = 2.29$, $p < 0.1$), the second phase ($F (3, 32) = 2.88$, $p < 0.1$) and across two experimental phases ($F (3, 68) = 5.41$, $p < 0.1$). These indicate that that there is at least one difference in leadership traits between two gender groups in each investigated time span. In addition, there is no conflict between multivariate tests and, hence, we can proceed to the next step to determine if there is statistical difference in each leadership trait between male and female leaders in each time span using univariate analysis of ANOVA with significance level of 10% or 0.1. We perform univariate analysis on leadership traits of two gender groups for each 15-period length of time similarly to what we have done with multivariate analysis so as to provide better understanding about the mean differences in leadership traits between gender sources.

Leadership traits	**Periods 1-15**		**F**	**Effect size**	η^2
	Males	**Females**			
Egalitarianism	2.917	3.083	0.130	.129	.004
Ambiguity Seeking	4.208	2.750	5.160**	-.803	.132
Machiavellianism	49.458	52.583	0.720	.300	.0208

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 35: Means of leadership traits by gender sources in the first 15 periods.

Leadership traits	Periods 16-30		F	Effect size	η^2
	Males	Females			
Egalitarianism	3.455	3.429	0.000	-.021	.000
Ambiguity Seeking	3.955	2.643	6.09**	-.844	.152
Machiavellianism	49.182	52.714	1.090	.356	.031

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 36: Mean of leadership traits by gender sources in the second 15 periods.

Leadership traits	Periods 1-30		F	Effect size	η^2
	Males	Females			
Egalitarianism	3.174	3.269	0.090	.075	.001
Ambiguity Seeking	4.087	2.692	11.590***	-.835	.142
Machiavellianism	49.326	52.654	1.830	.332	.026

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1.

Table 37: Mean of leadership traits by gender sources across both phases.

It can be seen from three *Tables 35, 36* and *37*, there is a consistent mean difference in ambiguity seeking between two gender groups throughout examined time spans. Effect size and eta-squared (η^2) are calculated to capture the magnitude of differences in leadership traits between gender sources. Effect size (Cohen's d) is measured by taking the mean difference of each leadership trait by gender sources and dividing it by the pooled standard deviation. A positive effect size suggests that female leaders have more of a specific trait than male leaders while a negative effect size signals the opposite. All significant mean differences have been marked with asterisk (*) and the number of asterisks dictates the strength of significance, based on univariate analyses (F-statistics). According to Cohen (1992), a difference of less than or equal to 0.2 (in absolute term) is considered to be small, between 0.2 and 0.5 is regarded as medium and more than 0.5 is classified as big. As we find that the effect size of ambiguity seeking is more than 0.8 of standard deviation in all time spans, we conclude that female and male leaders are largely different from each other in terms of ambiguity seeking and male leaders are less ambiguity-averse than female counterparts.

Eta-squared (η^2) is a conservative estimate of effect size and revealing the overall difference in each leadership trait by gender sources. It also provides information about the magnitude of mean differences between two groups of observations. Cohen, Miles and Shevlin (2001) give a rule of thumb for eta-squared as the following: eta-squared that is up to 0.01 signals a small effect, more than 0.01 and up to 0.06 is regarded as medium effect and more than 0.06 is categorised as big one. Throughout both phases, eta-squared values are consistently larger than 0.06, hence it leads to the same conclusions as effect size does meaning that mean difference in

ambiguity seeking between female and male leaders are big and male leaders are more ambiguity seeking than female ones.

Result 4: *Male leaders are more ambiguity-seeking than their counterparts of the opposite gender.*

5. Leadership traits and re-election

Hypothesis 5: *Leaders with stronger leadership traits have higher likelihood to be re-elected.*

We have seen so far a variety of angles of leadership traits and their impacts on leaders' salaries, groups' performances and members' happiness. We also see how leadership characteristics are different between leaders of different genders. In this hypothesis, we direct our attention to an important aspect of leadership, which is the likelihood to be re-elected of a leader. In politics, how to gain good outcomes in the next general election has become a detrimental task of political party leaders. In previous studies, the decision to remove of keep a

So as to find the nexus between leadership traits and leaders' possibilities to be reselected in the next experimental phase, we firstly compute the number of 'yes' and 'no' answers by group members to the question 'Do you want to remove your current leader?'. It is noted that this question has to be taken by any group member at the end of each 15 periods of leadership treatments. Then, we run regression of the number of 'yes' answers, which indicate the number of votes to remove a leader from leading position, on the identified characteristics of effective leadership. Poisson regression model with robust standard error is employed to gauge the relationship between dependent and independent variables as the number of removal votes takes the values of 0, 1, 2 and 3. We perform Poisson regression for each experimental phase and for all observations of both phases to provide a thorough understanding about the interaction between leadership traits and the number of removal votes over time. Data of treatments *LP*, *LA*, *LCC*, *LAH*, *LIC* and *LCCH* are employed for the current hypothesis.

	Phases		
	Periods 1-15	**Periods 16-30**	**Periods 1-30**
Openness	.453853**	.725999***	.5585943***
	(.1781505)	(.1770981)	(.1260904)
Neuroticism	.4846554**	.1569996	.2867065**
	(.2051219)	(.1845783)	(.137731)
Egalitarianism	-.2174538**	-.0411988	-.1151013*
	(.0875425)	(.0749195)	(.0635025)
Risk (Dohmen-type)	.0859632*	-.0188906	.0206523
	(.0478418)	(.0408272)	(.037663)
Machiavellianism	.4131583*	.4437134*	.3628066**
	(.2403209)	(.2369545)	(.1614215)
Constant	-3.811056**	-3.610972***	-3.237613***
	(1.606445)	(1.347137)	(.9687147)
Observations	36	36	72
Chi-squared test (p-value)	0.02**	0.00***	0.00***

***p < 0.01, **0.01 ≤ p< 0.05, *0.05 ≤ p ≤ 0.1, robust standard errors in parentheses.

Table 38: Poisson regression predicting the number of removal votes.

From the *Table 38*, it is found that, in the first phase, leaders with higher scores on openness to experience, neuroticism, risk-seeking, Machiavellianism and lower score on egalitarianism are more likely to be voted down by followers at the end of each 15 periods. Openness to experience concerns with the level of being creative of an individual (Burger, 2008; John and Srivastava, 1999). This aspect of Big Five test has been found to have no relation to leadership by Judge and Bono (2000). Neuroticism reveals one's emotional stability emotion (Pervin, 1989; Barrick and Mount, 1991) and there have been numerous studies demonstrating the negative impact of this personality trait on leadership ability (Judge et al., 2002). Machiavellianism is depicted by Christie and Geis (1970) as being lack of interpersonal skills and conventional morality as well as being opportunistic. Burks, Carpenter and Verhoogen (2003) find that people with Machiavellianism exhibit selfish behaviour in trust game. Egalitarianism relates to one's preference for minimizing the differences in payoffs between self and others (Capraro et al., 2017). Mittal and Dorfman (2012) highlight egalitarianism is endorsed as one of the most important elements of servant leadership. Risk attitudes play an important part in one's leadership capacity and have been discussed in various studies (Ertac and Gurdal, 2012; Daft, 2008). In the current hypothesis, participants' risk preferences are measured by test of Dohmen et al. (2011) and found to be positively correlated with the number of removal votes. We conjecture that group members are less interested in risk-seeking leaders and want to look for those with higher risk awareness when distributing collective outputs or communicating with followers.

In the second phase, leaders with high scores on openness to experience and Machiavellianism are found to receive more removal votes than others. Impacts of neuroticism, egalitarianism and risk attitudes on the number of removal votes become weakened and insignificant in the second half of the experiments. As aforementioned, openness to experience has been proved to have no influence on one's leading capacity (Judge and Bono, 2000). Herein, openness to experience positively correlates with the number of removal votes indicating that leaders with high creativity and imagination are less successful and incompetent. Machiavellianism, as aforementioned, refers to one's opportunism, lack of interpersonal skills and conventional morality (Christie and Geis, 1970). Gächter et al. (2012) show Machiavellian leaders contribute less to the public good. In addition, Drory and Gluskinos (1980) highlight leaders with high scores on Machiavellianism tend to give more orders, less attempt to reduce tension within groups and demand more assistance from followers.

Overall, throughout two experimental phases, we find that leaders with more openness to experience, neuroticism, Machiavellianism and lower score on egalitarianism are more likely to be voted down by followers. These results are in line with traits of efficient leadership that are identified in hypothesis 2 of the current chapter. As a reminder, characteristics of efficient leadership are featured by high scores on egalitarianism, ambiguity seeking and less neuroticism and Machiavellianism. Therefore, we can conclude that leaders with weak leadership traits are more likely to be removed by group members at the end of each experimental phase. A Chi-squared test is also performed on the Poisson model for both phases (periods 1-30) to test the overall significance of our findings. As the test's p-value is relatively small (p-value < 0.0001), we can confirm that our model is statistical significant.

To graphically illustrate our results, we also provide a bar graph of leader removal votes over each characteristics of efficient leadership in *Figure 9*. For openness and neuroticism, we see that as the number of removal votes increases, scores of these characteristics also increase while, for egalitarianism, we observe the opposite. Regarding Machiavellianism, however, we do not see a consistent relationship between this trait and the number of removal votes. Machiavellianism scores increase in the domain of 0 and 2 removal votes and decrease in the domain of 3 removal votes. This suggests that the effect on Machiavellianism on the likelihood a leader is removed is less persistent than the other three traits in the domain of removal votes.

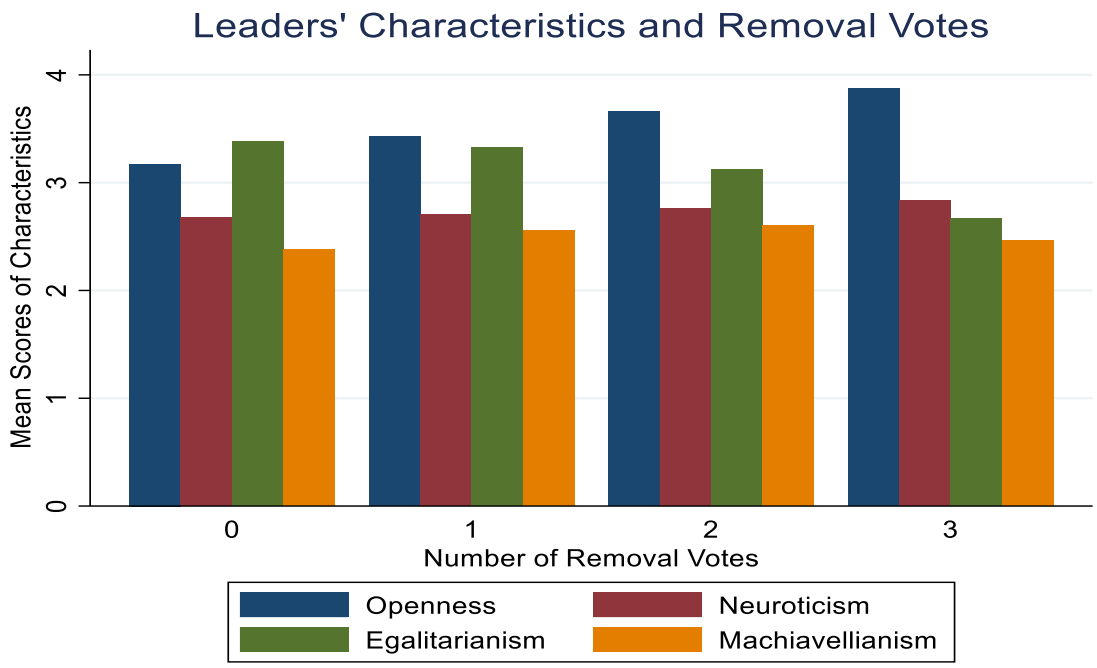


Figure 9: Leader's Characteristics and Removal Votes.

Result 5: *Leaders, who are more openness to experience, neurotic, Machiavellian and less egalitarian, are more likely to be removed from leading position.*

V. Summary and Conclusion

Our study concentrates on investigating characteristics of efficient leadership and their impacts on leaders' fixed salaries, group's performances and followers' satisfaction with the leaders. We also want to see how leadership efficiency differs between males and females and contribute to current literature further understanding about dissimilarities in leading styles between gender groups. In previous studies, it is found that female leaders are less risk-seeking than male counterparts (Ertac and Gurdal, 2012). In addition, females are found to score higher on neuroticism (Budaev, 1999) and Machiavellianism (Steininger and Eisenberg, 1976). Additionally, Cole (2004) mention that women are significantly fairer than men in terms of performing supervision roles. Last but not least, in this chapter, we examine the correlation between efficient leaders' characteristics and the likelihood leaders are voted down by followers. While party leader removal has been closely investigated in political studies, it has not been well studied in experimental economics and management. Mesquita and Smith (2010) and Flores and Smith (2011) are typical papers of political science that pay close attention to the impact of leader removal mechanism and performance of organisation.

Our main findings are as the following. Firstly, we explore that leaders with lower scores on neuroticism, openness to experience and higher scores on loss aversion and self-esteem receive higher offers from group members. Secondly, we find that individuals with higher scores on egalitarianism, ambiguity seeking and lower scores on neuroticism and Machiavellianism are efficient leaders as they are able to elevate collective outputs of the groups they lead. Third of all, in the current chapter, it is found that group members are happier with leaders that have strong leadership traits. In particular, leaders with high scores on egalitarianism and lower scores on Machiavellianism are rated higher on satisfaction scale by followers. Fourthly, we find that between males and females, there is a significant difference in leadership characteristic, which is the level of ambiguity seeking. Male leaders are distinguished from female counterparts in their higher level of ambiguity seeking. In other words, male leaders are less ambiguity averse than female ones. Finally, we discover that the likelihood a leader survives a removal vote depends on their leadership traits. In specific, if leaders have higher scores on openness to experience, neuroticism, Machiavellianism and lower score on egalitarianism, they are more likely to be removed from their leading positions by group members.

Our research has multiple implications for management, leadership experts and political scientists. First of all, from management perspectives, how to improve firms' profitability and employees' productivity are important goals of corporate leaders. In our study, we find that leaders with high scores on egalitarianism, ambiguity seeking and low scores on neuroticism, Machiavellianism enhance collective performances. In addition, we also explore that leaders scoring low on Machiavellianism and high on egalitarianism obtain more satisfaction from followers. Fisher (2010) and Patterson et al. (2004) show that employees' satisfaction or happiness at work plays a decisive role to their productivity and, hence, companies' success. Therefore, by organizing training sessions to improve leadership capacity for line managers and supervisors based on characteristics of efficient leaders specified in our research, companies can increase their remuneration and boost collective productivity in the long run. Furthermore, head hunters can utilise our results to establish lists of potential candidates for upper management positions in big companies at a faster pace and save more recruitment costs for corporate clients and head hunters themselves.

Secondly, our research provides indications for leadership experts, who have been in dispute over key traits of effective leadership for almost a half of the century. In existing literature, charismatic leadership attracts much attention from scientists and emerges as one of the most effective leading styles. Charismatic leaders are described as individuals with emotional impact on people as they have the ability to inspire and motivate followers to exert more efforts and overcome obstacles to achieve common goals (Daft, 2008). However, there are still debates on the pre-eminence of charismatic leadership and some experts on leadership have challenged whether all successful leaders are charismatic ones. In our research, we find that leaders, who scores high on egalitarianism, ambiguity seeking and low on neuroticism and Machiavellianism, raise groups' performances. These results, on the one hand, help resolve arguments on key traits of an effective leader and pave the way for development of leadership theories.

Before our study, since there is no consensus on what constitutes a good leader it is difficult for scientists to model behavioural roles and functions of leaders in organisational context. On the other hand, our findings facilitate developing appropriate training programs to equip firms' managers, supervisors and even students, who are expected to be the world's future leaders, with necessary characteristics and behaviours to perform leadership duties.

Another long-standing question in leadership study is whether women or men are better leaders and how they differ from each other in terms of individual characteristics. In our study, we see no difference in collective performances between groups led by male leaders and female ones suggesting that genders do not play a detrimental role to efficient leadership. This is in line with Appelbaum, Audet and Miller (2002) as they demonstrate that women's leadership is not less effective than men's. Moreover, Appelbaum, Audet and Miller (2002) even show that the statement that females' leadership is less efficient than males' is not based on facts but rather dictated by socialization to the extent that it becomes persistently accepted. However, we explore that there is one distinguishing characteristic between male and female leaders, which is ambiguity-seeking. It is found that male leaders tend to be more ambiguity-seeking than female counterparts. Schubert et al. (2000) and Eckel and Grossman (2008) also come up with similar results as they prove that women are more averse to ambiguity than men. Our findings, thus, imply that researches on leadership should be re-directed because the answer to the question if there is difference in leadership effectiveness between sexes is now clear and researchers should understand that the efficiency of leadership relates more to individual traits rather than to sexes or gender roles (Appelbaum, Audet and Miller, 2002).

Last but not least, for political scientists, our research provides useful indications on what voters expect from election candidates and how party leaders increase their chances to be re-elected in the next election. One of our findings recommends that group members prefer leaders, who are less neuroticism, openness to experience and more loss aversion, self-esteem, and offer higher salaries to such leaders. Election candidates with such traits, hence, should stand a better chance than others to earn voters' support and win elections. For those without or with few traits of effective leadership, they can practice on a frequent basis to obtain those traits and, as a consequence, gain more advantages in running election campaigns. Also, we discover that leaders with higher score on openness to experience, neuroticism, Machiavellianism and lower score on egalitarianism are more likely to be removed by followers. Thus, if party leaders want to survive their upcoming polls, they should not have or exhibit behaviours that are related to characteristics group members disregard.

Herein, we also want to discuss some limitations of our study. This current chapter only addresses some critical aspects of leadership, which include allocation authority and one-way communication. Nevertheless, we notice that leaders can influence their groups in other ways such as imposing a minimum amount of contribution on each individual or employing two-way communication. Hence, we want to see these features being covered in future experiments and expect to compare the impacts of different interactions between leaders and members have on salary offers,

collective performances, followers' satisfaction and the likelihood leaders are removed. Another direction future researches can follow is to grant group leaders the authority to distribute outputs and the role to communicate with followers simultaneously. In particular, we want to see how leaders with allocation authority and responsibility to send common messages influence group members' behaviour in the public good game. Similarly, the treatment in which leaders can make decision on allocation amounts and send individual messages to each follower is also worth examining. Results from these treatments can be then used to compare with our findings in the current chapter to strengthen the importance of leaders in organisational structure as well as to captivate the group members' behavioural shifts from period to period.

Also, in our research, group members obtain information about potential leaders mainly from written abstracts although we have plenty of other data on participants' personalities and abilities that are elicited at the beginning of each experimental session. We, therefore, expect future studies to supply more details about leadership candidates prior to the voting stage with a view to helping group members make better leader selections. We are also interested in comparing the impacts of different sources of information about potential leaders have on followers' leadership choices. Furthermore, later studies can elaborate on our research by letting leaders contribute in the public good game as well. Gächter and Renner (2003) and Levati, Sutter and Heijden (2007) show that group members' contributions positively correlate with leaders' contributions. Hence, if our treatments are replicated in future researches and leaders are allowed to contribute to the public good, groups' performances can be increased significantly and we might observe higher happiness from all followers. Salary offers to leaders in the voting stage can also be developed as group members now realise that leaders not only play an important role in distributing output and encouraging people to make contributions but they also donate their own wealth to collective benefits.

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APPENDIX

1) Average salary offers and average contributions of efficient and inefficient groups in phase 1

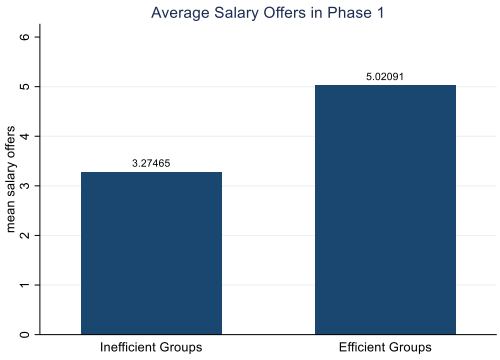


Figure 10: Phase 1's average salary offers.

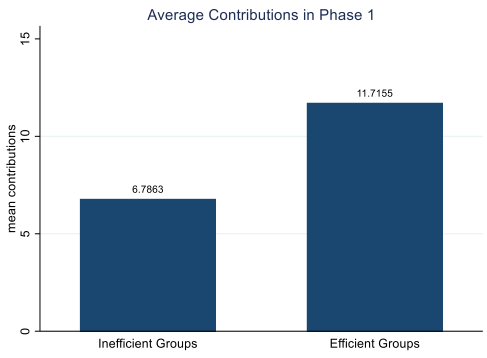


Figure 11: Phase 1's average contributions.

2) Comparison between Leadership and Management

	Management	Leadership	Literature
Direction	_ Planning and Budgeting	_ Creating vision and strategy	Weathersby (1999)
Alignment	_ Directing and Controlling _ Creating Boundaries	_ Creating share values and culture _ Reducing boundaries	Weathersby (1999), Daft (2008)
Relationship	_ Based on position and formal authority	_ Inspiring and motivating followers	Jacobs (1970), Daft (2008)
Personal Qualities	_ Expert mind, conformity, insight into organization, talking	_ Open-minded, non-conformity, emotional connection	Daft (2008)
Outcomes	_ Maintain stability and efficiency	_ Create changes and a culture of integrity	Zaleznik (1977), Daft (2008)

Table 39: Comparison between Leadership and Management.

3) Experiment's screenshots

- **Stage 1: Characteristics and Abilities Tests**

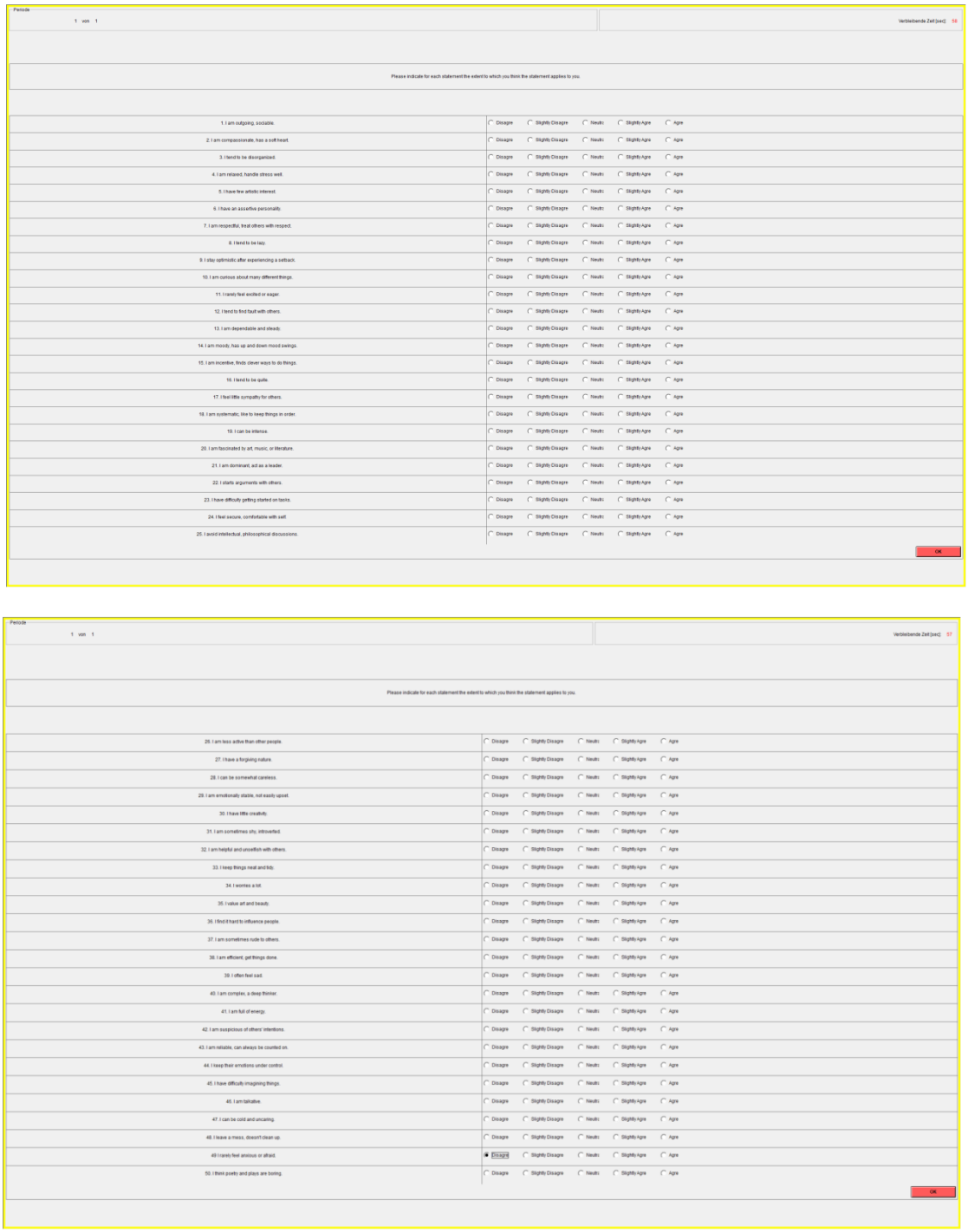


Figure 12: Big 5 test.

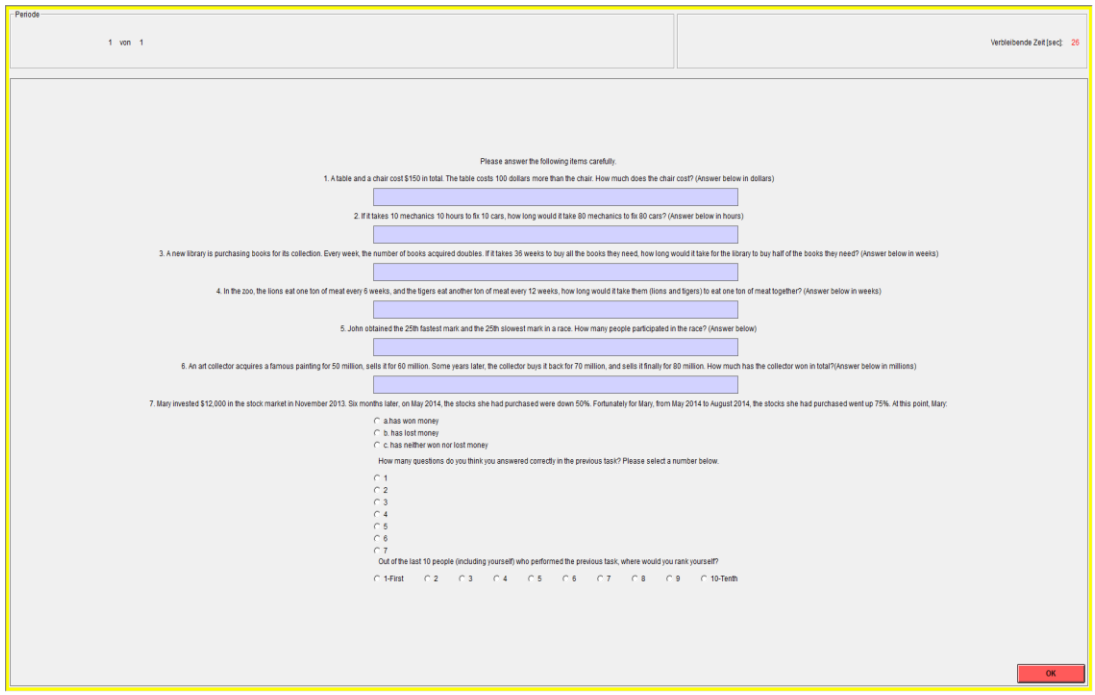


Figure 13: Cognitive Reflection Test.

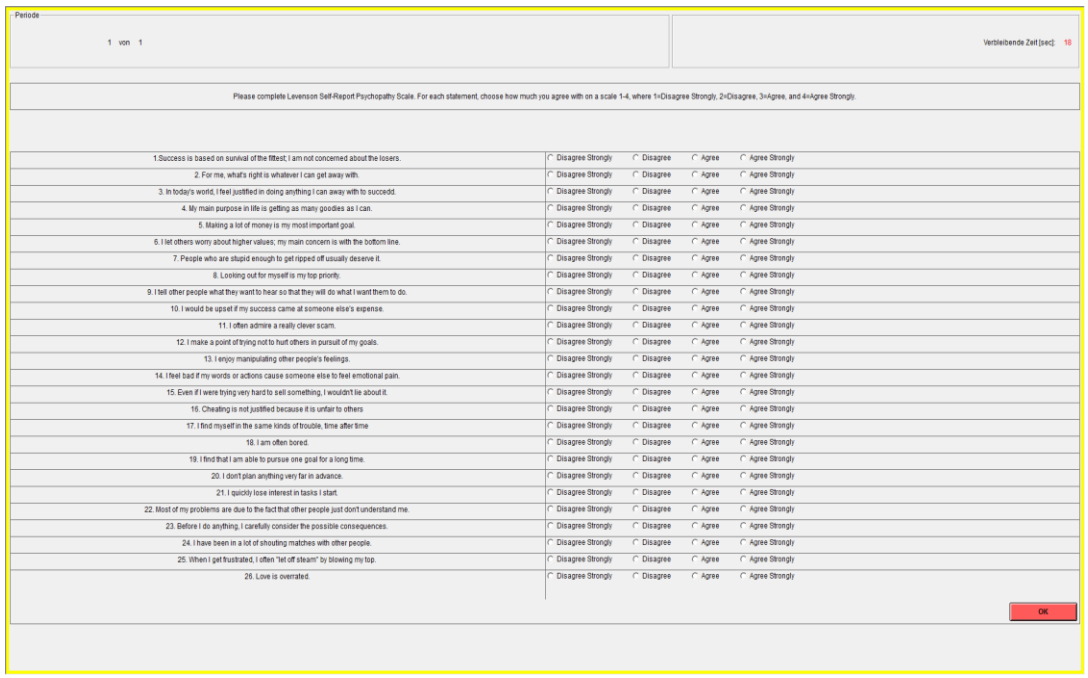
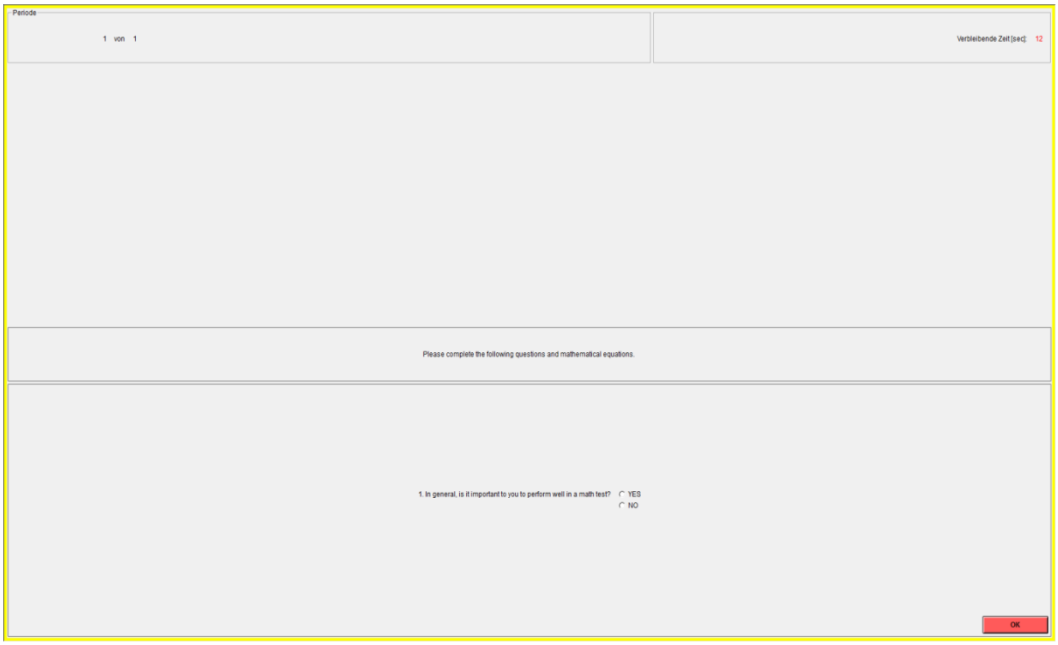


Figure 14: Psychopathy Test.



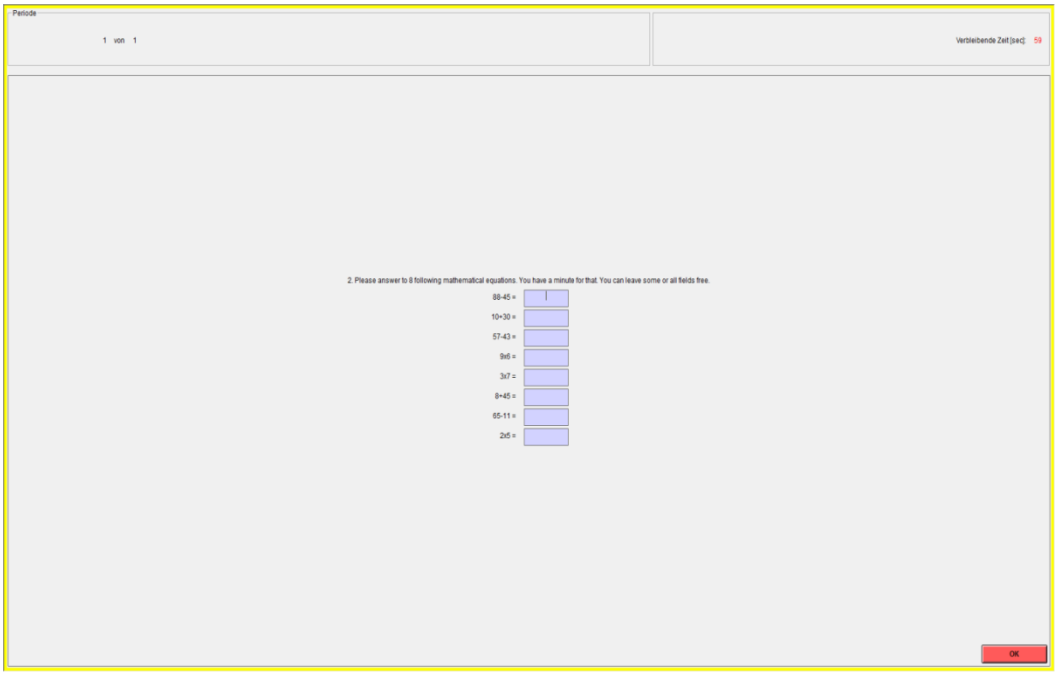
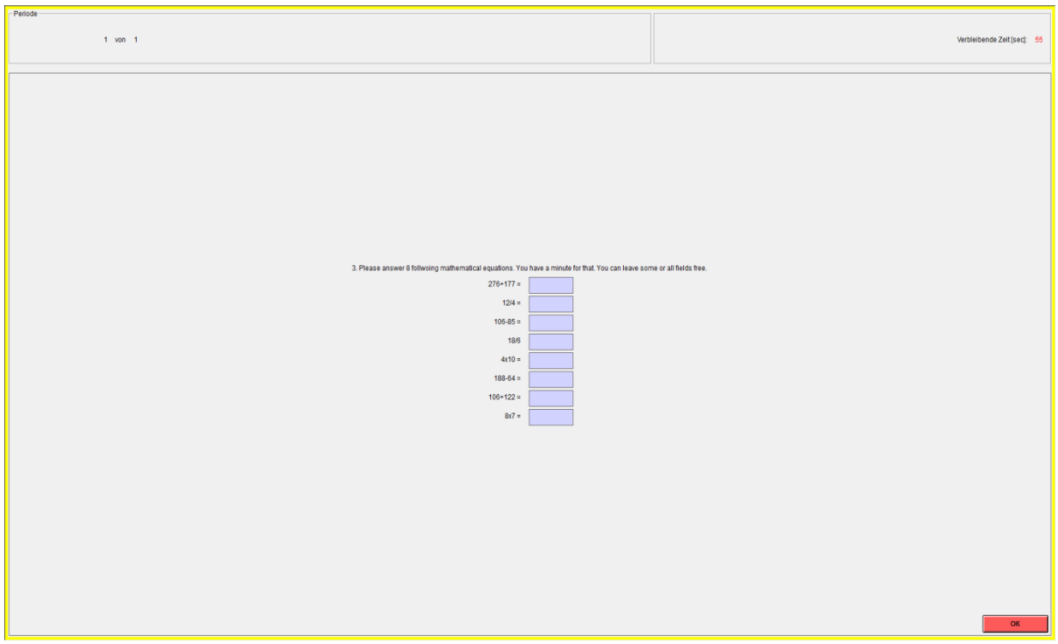


Figure 15: Math Test.



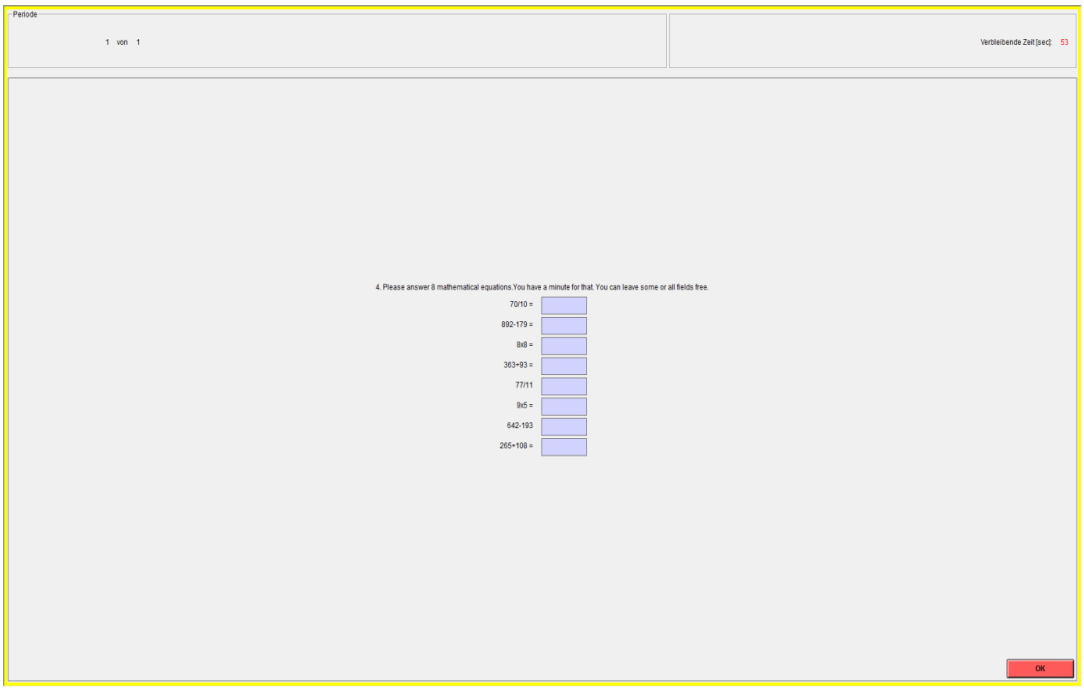


Figure 16: Math Test (cont.).

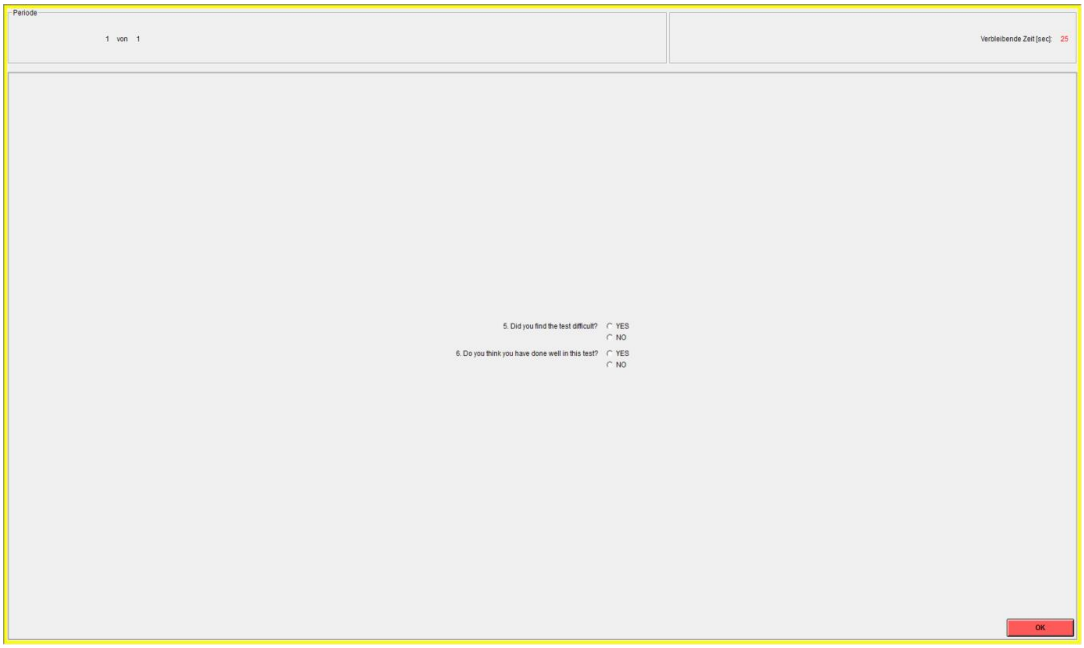


Figure 17: Math Test (cont.).

- **Stage 2: Writing the abstracts**

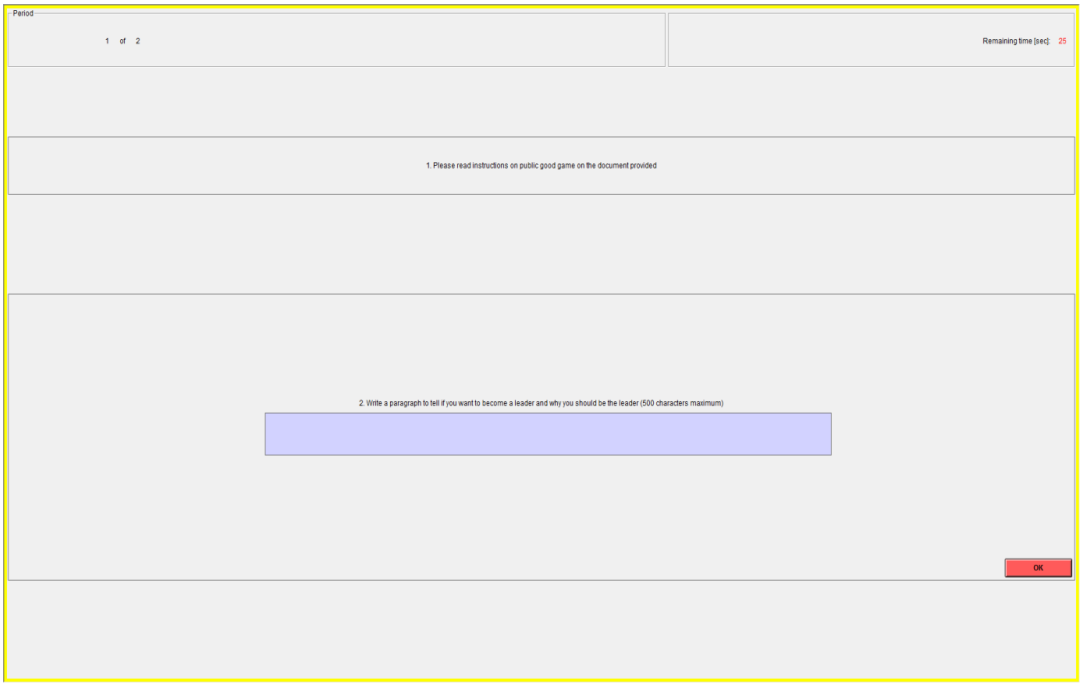


Figure 18: Public Good Game Instructions and Writing Paragraphs.

- **Stage 3: Randomly selecting potential leaders**

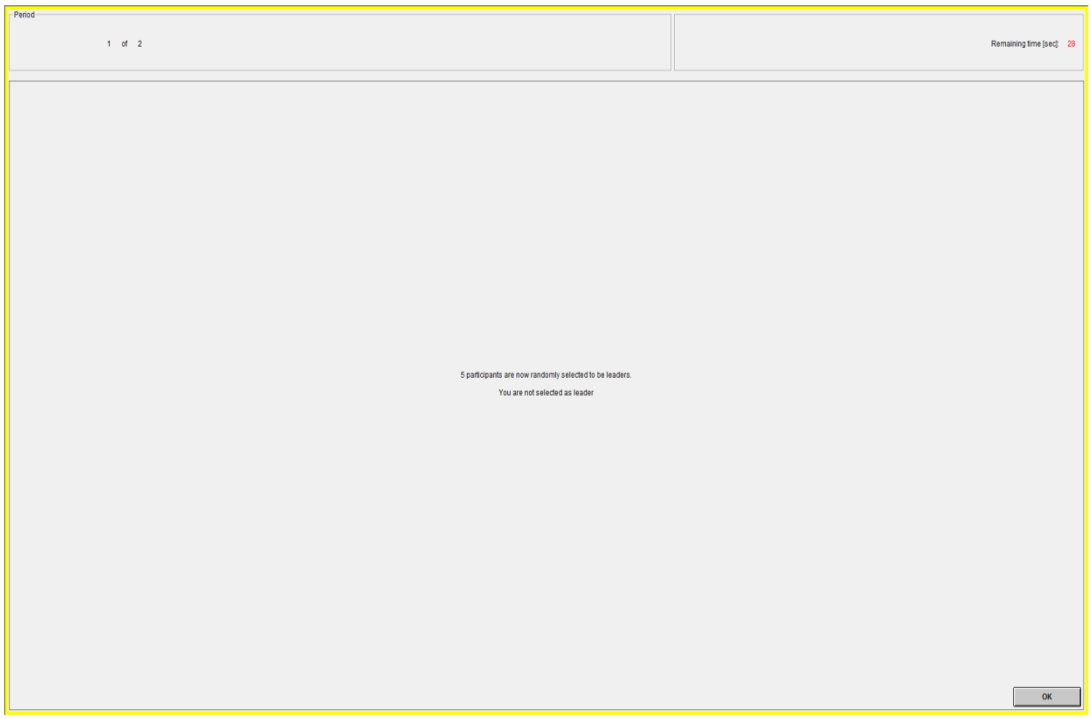


Figure 19: Randomly Selected Leaders.

- **Stage 4: Reading the abstracts**

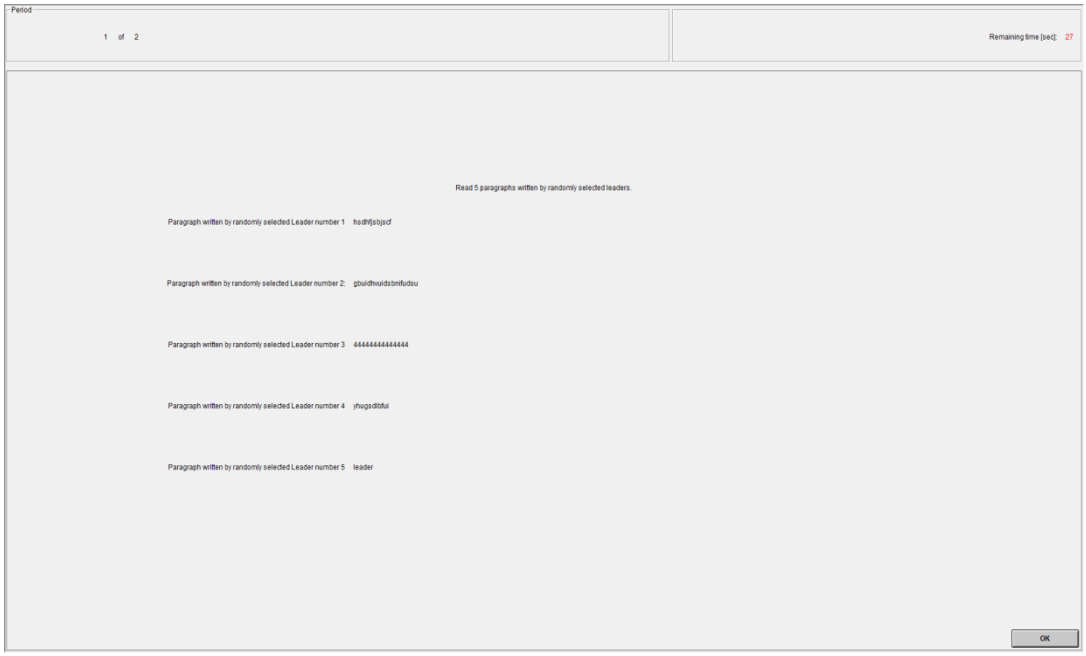


Figure 20: Reading the Abstracts Written by Potential Leaders.

- **Stage 5: Making offers to potential leaders and choosing groups to lead**

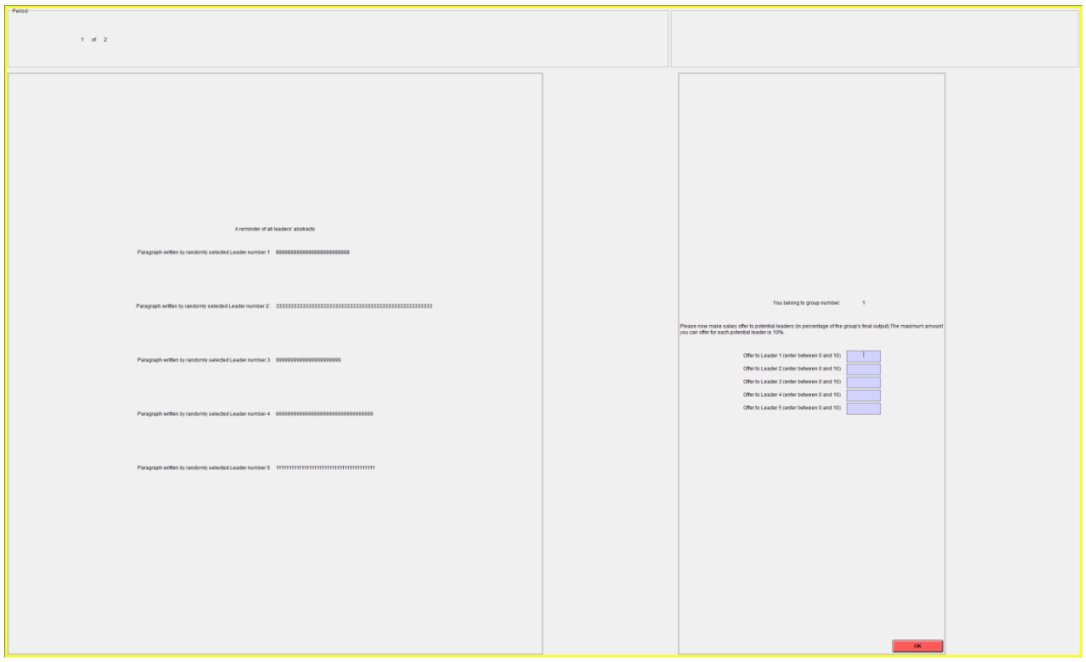


Figure 21: Making Offers to Randomly selected Leaders.

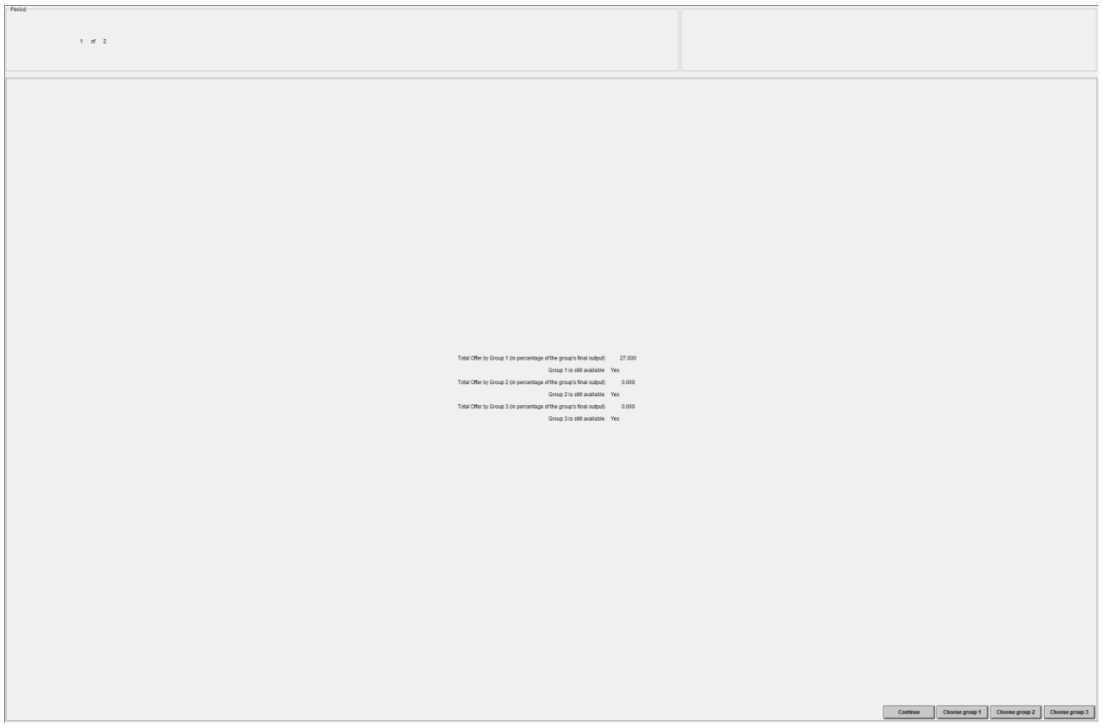


Figure 22: Choosing the Group to Lead.

- **Stage 6: Public good game**

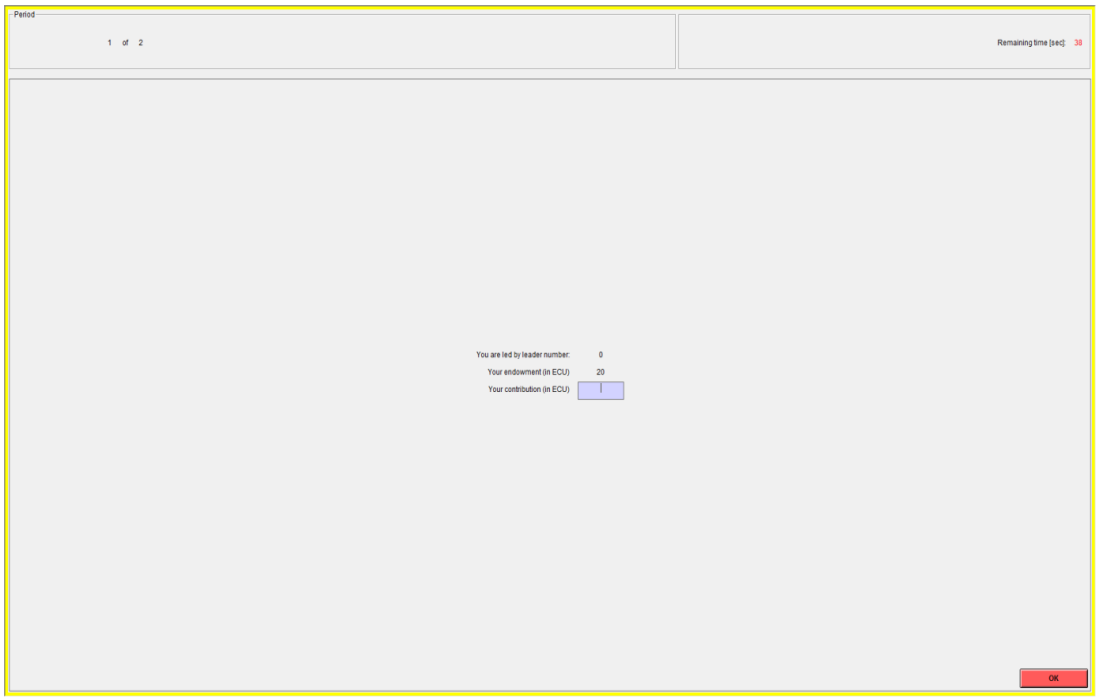


Figure 23: Playing the Public Good Game.

- **Stage 7: Allocation of group's final output**

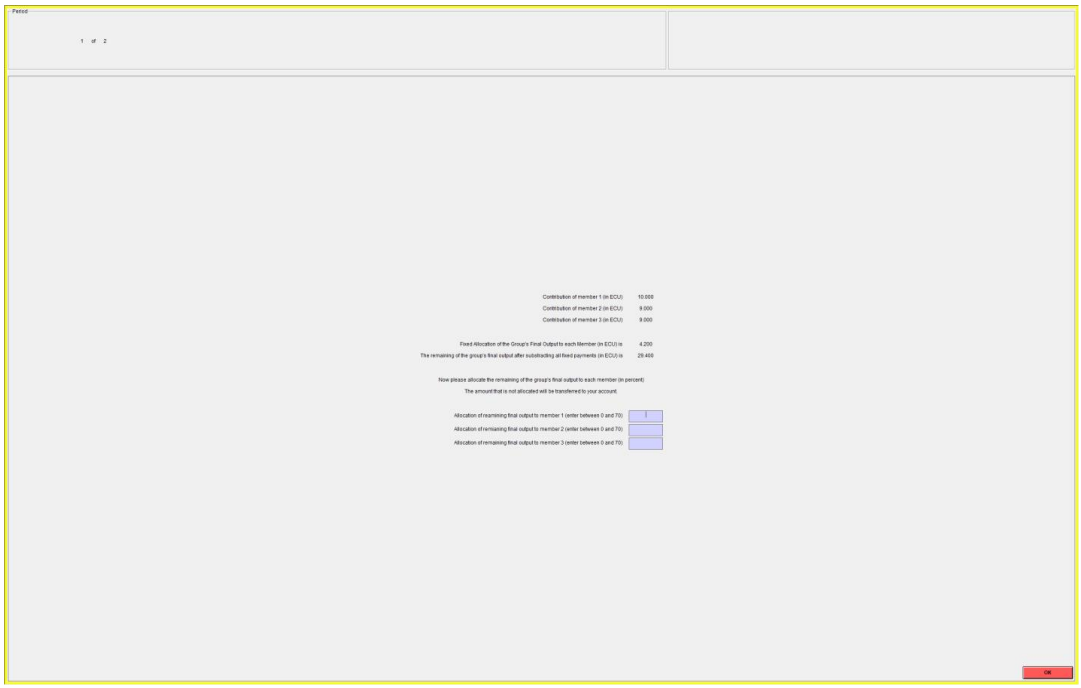


Figure 24: Allocating Final Output to Group Members.

- **Stage 8: All public information**

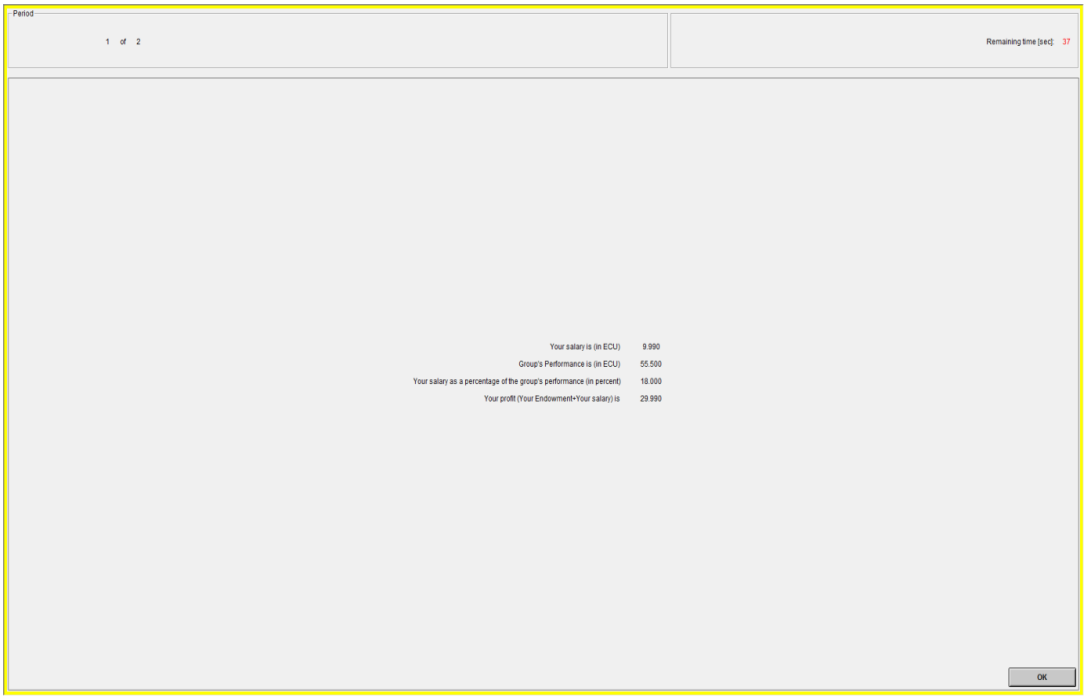


Figure 25: Information about Salary and Profit for Current Period.

From period 1 till period 14, participants will return to stage 6 after finishing stage 8. However, in the 15th period, subjects will proceed to stage 9 after leaving stage 8.

- **Stage 9: Job market**

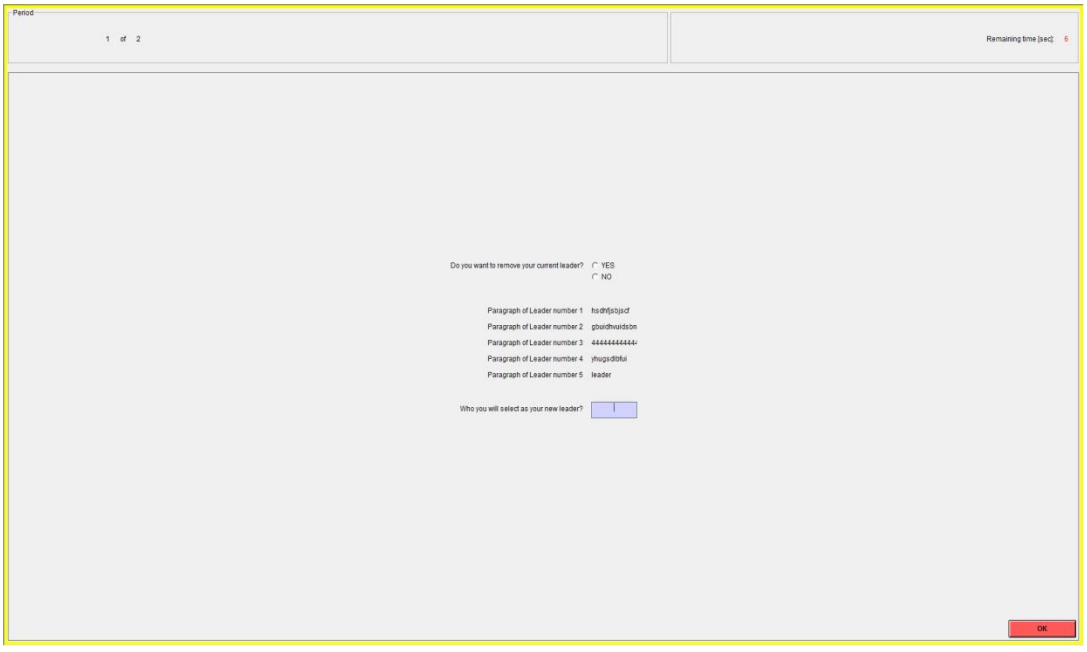


Figure 26: Keeping the old or selecting a new Leader.

4) Groups' Performances and Number of Removal Votes

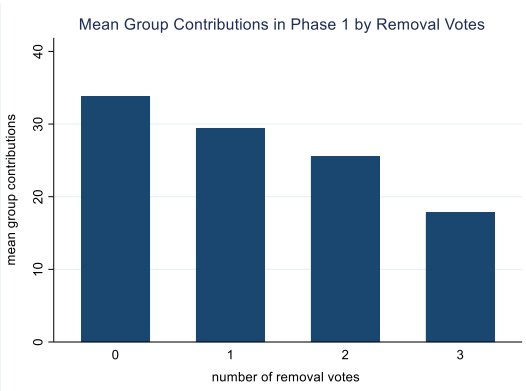


Figure 27: Mean Group Contributions in Phase 1 by Removal Votes.

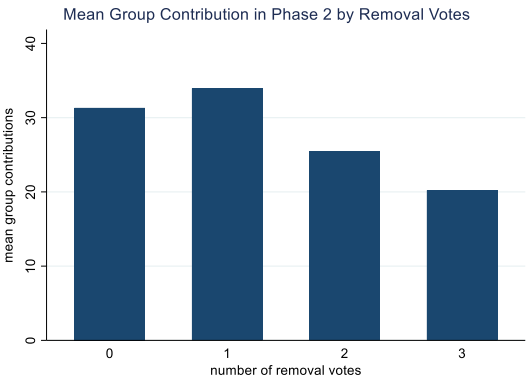


Figure 28: Mean Group Contributions in Phase 2 by Removal Votes.

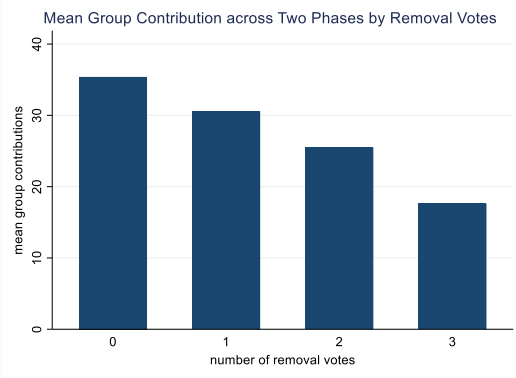


Figure 29: Mean Group Contributions across Both Phases by Removal Votes.

5) Linguistic Inquiry and Word Count (LIWC) 2015 – Selected Word Categories for Analysing Leadership Texts

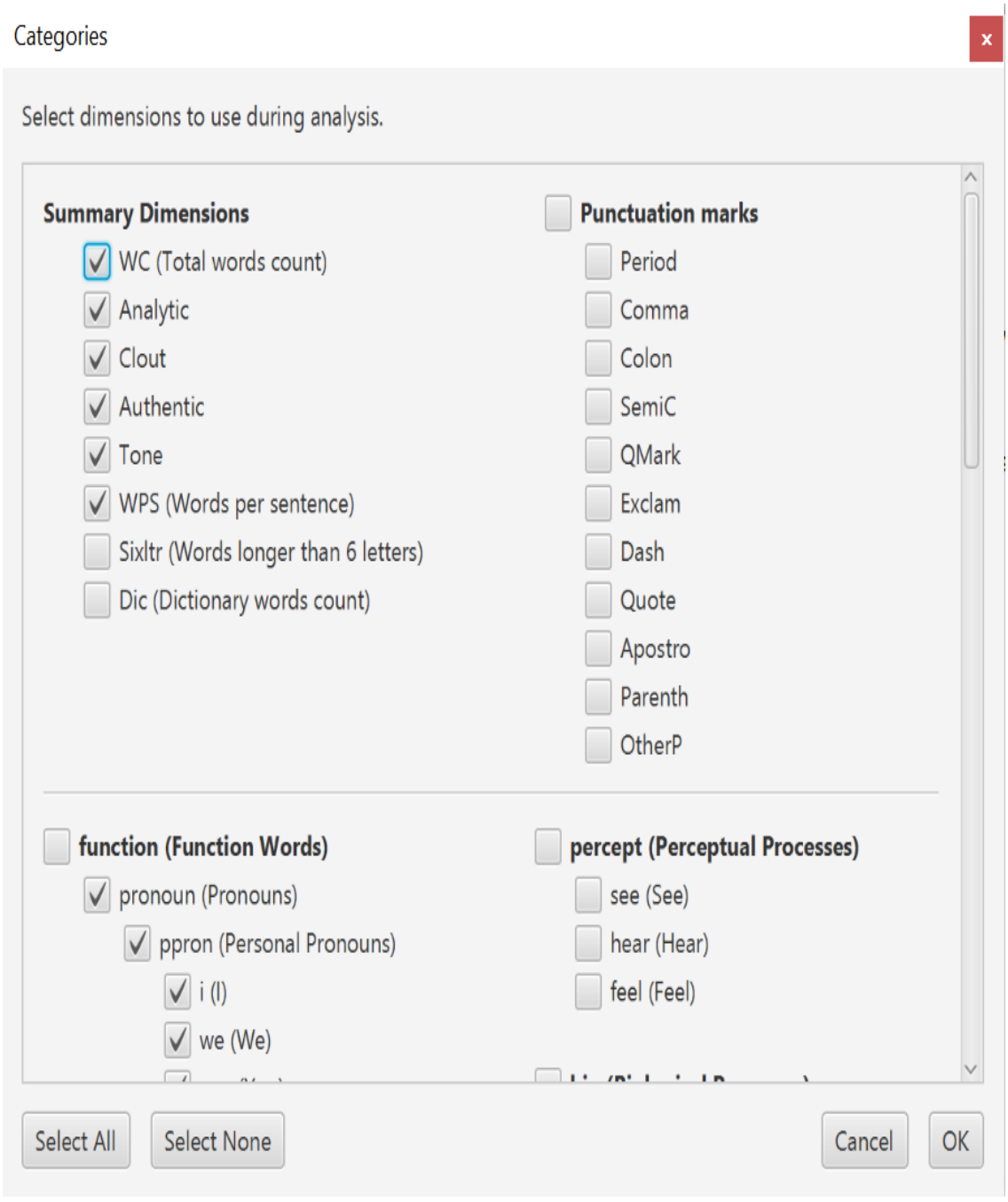


Figure 30: LIWC2015 Category Options.

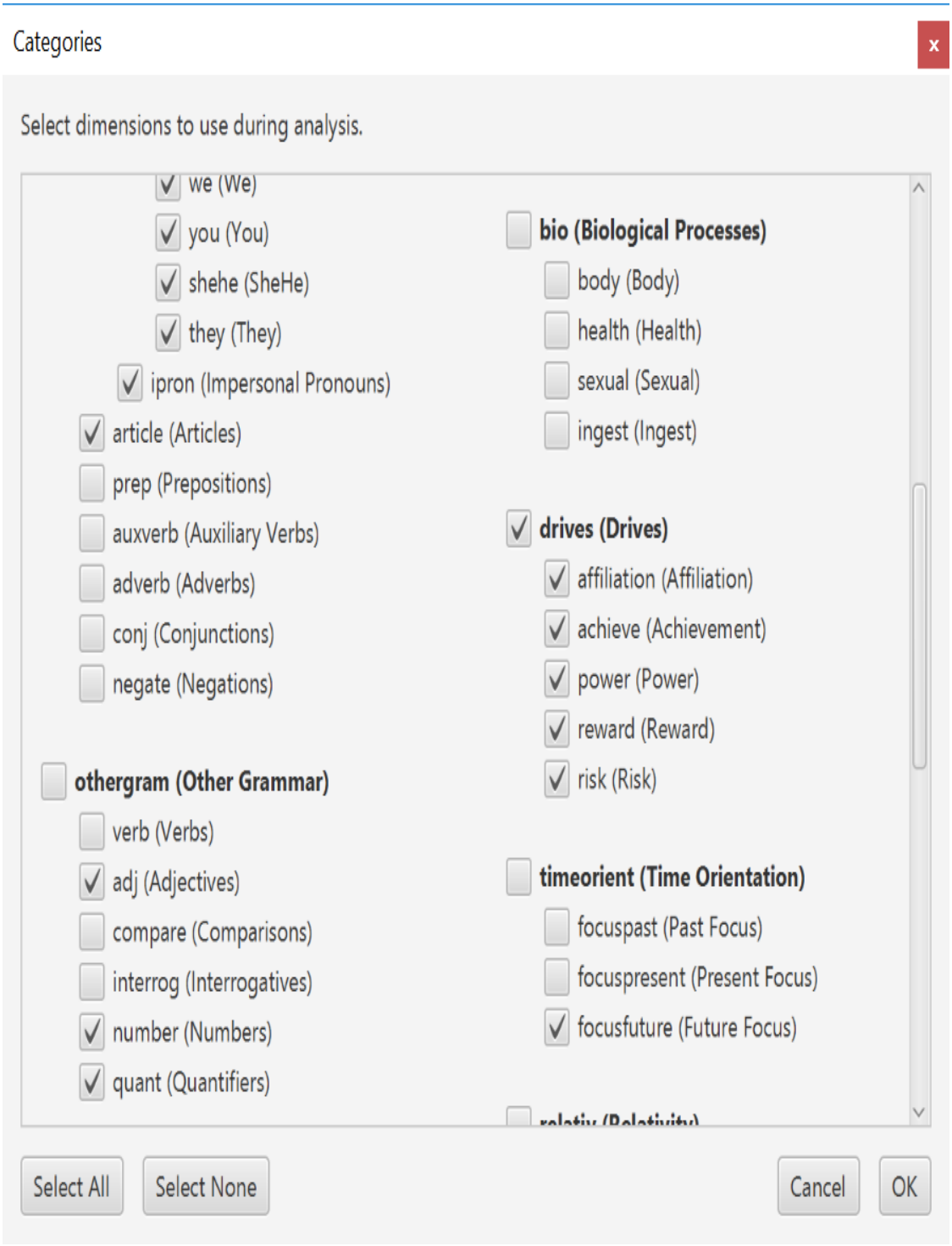


Figure 31: LIWC2015 Category Options (cont.).

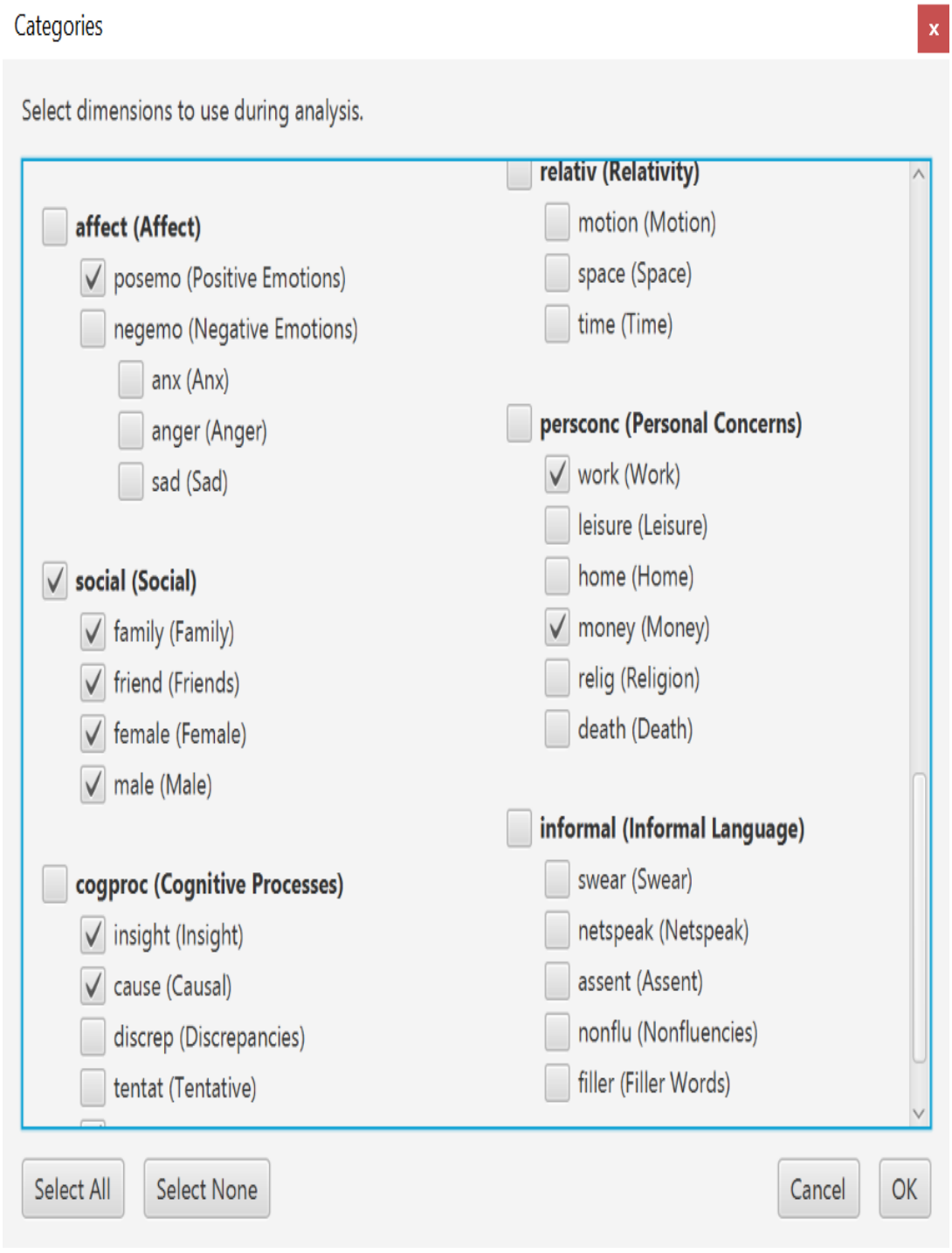


Figure 32: LIWC2015 Category Options (cont.).

6) Average salary offers and average contributions of efficient and inefficient groups in phase 2

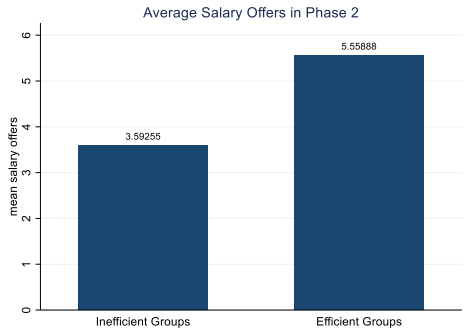


Figure 33: Phase 2's average salary offers.

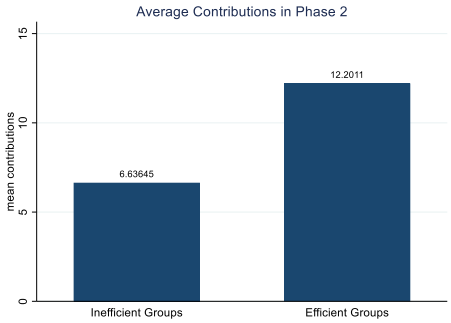


Figure 34: Phase 2's average contributions.

7) Rankings of Treatments by Average Contributions and Payoffs

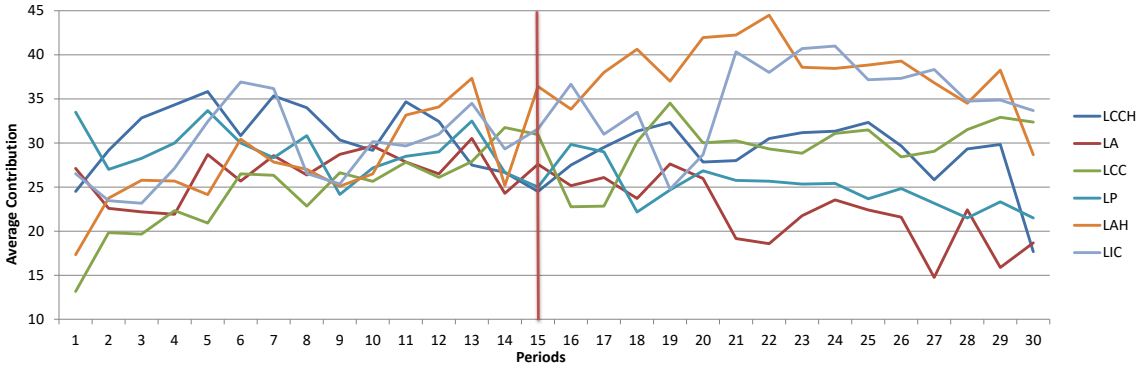


Figure 35: Average Contributions of Leadership Treatments.

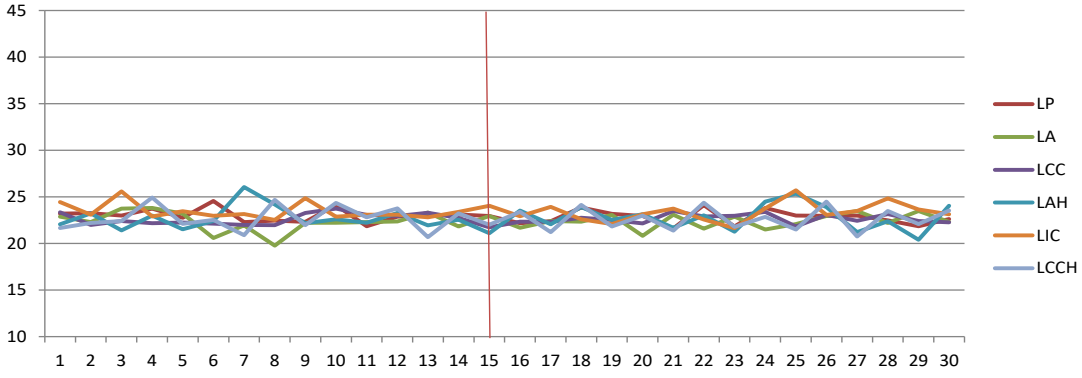


Figure 36: Average Payoffs of Leadership Treatments.

Rankings of Groups by Average Contribution (*LP*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	2	1	48.133335	22.9109
2	2	6	43.746685	22.26395
3	2	5	24.46665	23.05165
4	2	2	20.783315	23.42155
5	2	4	16.067555	23.10005
6	2	3	10.4	22.68995

Table 40: Rankings of Groups in *LP* by Average Contribution.

Rankings of Groups by Average Contribution (*LA*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	3	6	40.546685	22.1761
2	3	1	28.333335	22.2552
3	3	2	26.766665	22.5704
4	3	3	21.351365	22.6869
5	3	5	19.93835	22.63585
6	3	4	11.623405	21.91045

Table 41: Rankings of Groups in *LA* by Average Contribution.

Rankings of Groups by Average Contribution (*LCC*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	4	2	45.78645	22.18425
2	4	1	26.56665	23.7597
3	4	3	26.24455	22.26745
4	4	6	24.319615	22.6928
5	4	5	19.6433	22.1498
6	4	4	18.73	22.74015

Table 42: Rankings of Groups in *LCC* by Average Contribution.

Rankings of Groups by Average Contribution (*LAH*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	5	5	37.5	22.69435
2	5	1	34.54778	23.7013
3	5	3	33.900015	22.68895
4	5	6	32.80165	23.03725
5	5	2	32.03335	22.08745
6	5	4	31.153435	22.48435

Table 43: Rankings of Groups in *LAH* by Average Contribution.

Rankings of Groups by Average Contribution (*LIC*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	6	5	43.999985	23.3209
2	6	2	40.02	22.6337
3	6	3	36.211985	23.78885
4	6	4	28.325885	24.3526
5	6	1	24.866665	23.584
6	6	6	21.500015	22.80435

Table 44: Rankings of Groups in *LIC* by Average Contribution.

Rankings of Groups by Average Contribution (*LCCH*)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	7	3	50.366685	22.1334
2	7	2	35.366665	22.478
3	7	6	32.56665	22.0947
4	7	1	28.689985	24.06795
5	7	5	23.633315	22.2719
6	7	4	8.6333335	23.499

Table 45: Rankings of Groups in *LCCH* by Average Contribution.

Rankings of Groups by Average Contribution in Both Phases (all leadership treatments)				
Rankings	**Treatment**	**Group**	**Average Contribution of Both Phases**	**Average Earnings of Both Phases**
1	7	3	50.366685	22.1334
2	2	1	48.133335	22.9109
3	4	2	45.78645	22.18425
4	6	5	43.999985	23.3209
5	2	6	43.746685	22.26395
6	3	6	40.546685	22.1761
7	6	2	40.02	22.6337
8	5	5	37.5	22.69435
9	6	3	36.211985	23.78885
10	7	2	35.366665	22.478
11	5	1	34.54778	23.7013
12	5	3	33.900015	22.68895
13	5	6	32.80165	23.03725
14	7	6	32.56665	22.0947
15	5	2	32.03335	22.08745
16	5	4	31.153435	22.48435
17	7	1	28.689985	24.06795
18	3	1	28.333335	22.2552
19	6	4	28.325885	24.3526
20	3	2	26.766665	22.5704
21	4	1	26.56665	23.7597
22	4	3	26.24455	22.26745
23	6	1	24.866665	23.584
24	2	5	24.46665	23.05165
25	4	6	24.319615	22.6928
26	7	5	23.633315	22.2719
27	6	6	21.500015	22.80435
28	3	3	21.351365	22.6869
29	2	2	20.783315	23.42155
30	3	5	19.93835	22.63585
31	4	5	19.6433	22.1498
32	4	4	18.73	22.74015
33	2	4	16.067555	23.10005
34	3	4	11.623405	21.91045
35	2	3	10.4	22.68995
36	7	4	8.6333335	23.499

Table 46: Rankings of All Groups by Average Contribution.

8) Distribution of Effective Traits of Leadership

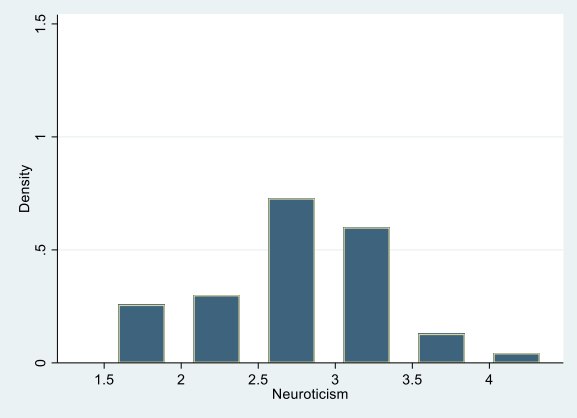


Figure 37: Distribution of Leaders' neuroticism.

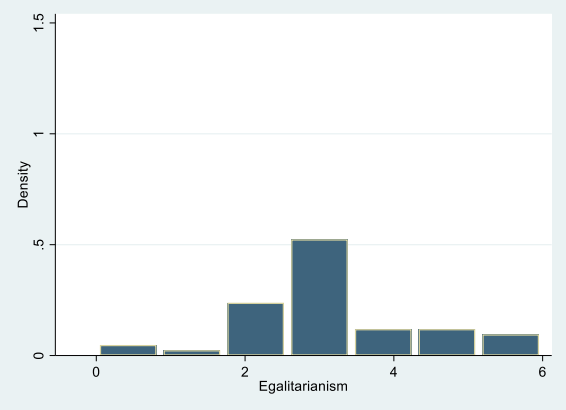


Figure 38: Distribution of Leaders' egalitarianism.

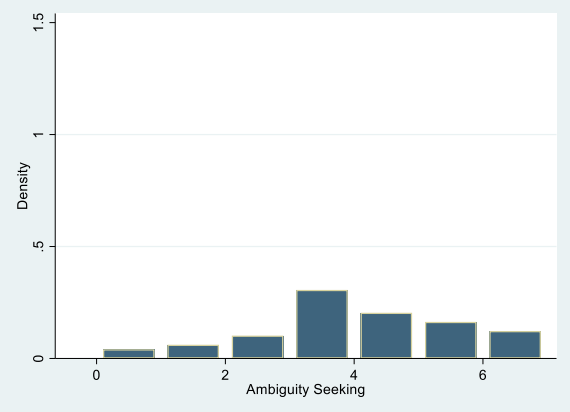


Figure 39: Distribution of Leaders' ambiguity-seeking.

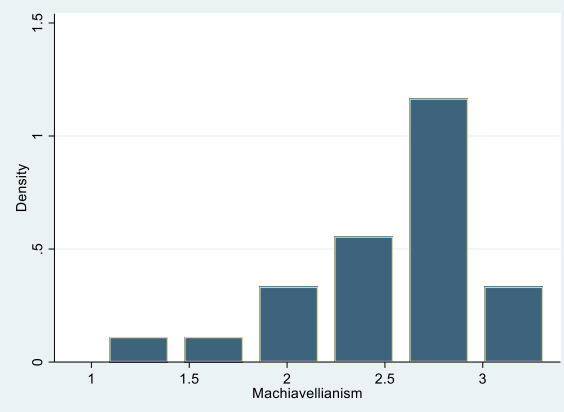


Figure 40: Distribution of Leaders' Machiavellianism.

9) Distribution of Words Count for Leaders Abstracts and Messages

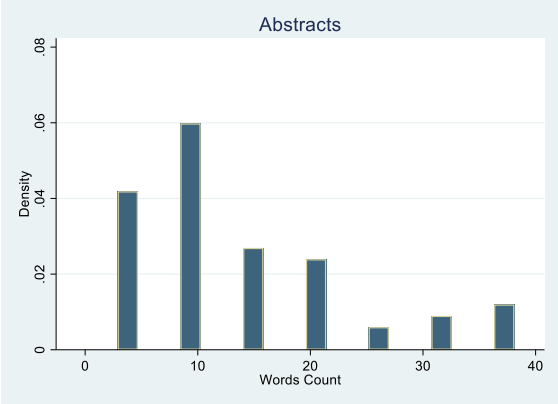


Figure 41: Distribution of Words Count for Leaders' Abstracts.

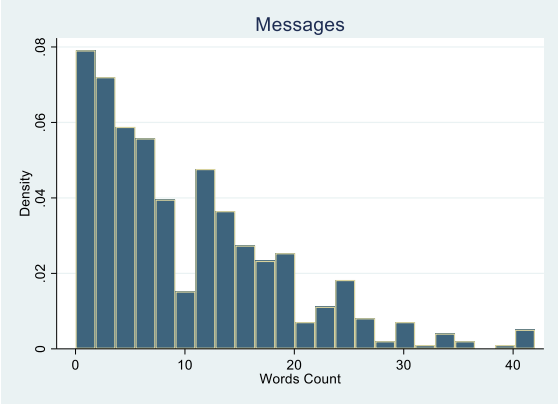


Figure 42: Distribution of Words Count for Leaders' Messages.

10) Experimental Instructions for All Treatments

a) Treatment *LN*

Welcome to the Centre for Research in Behavioural Science (CRIBS) at the University of Nottingham, UK.

Thank you for your participation. Your choice and decision during the experiment will be kept confidential and are only used for research purposes. In this experiment, you have to select the leaders, decide how much to contribute to the public good, and evaluate your leaders. If you follow the instructions properly and make good decisions, you might earn a considerable amount of experimental currency units (ECUs), which will be converted into cash at the end of the experiment using the following exchange rate:

108 ECUs = £1

Before the experiment starts, you will be asked to fill in some online surveys. Each of you will be allocated a link to the surveys where you are expected to provide your ID numbers and answer all of the questions given. Then, you will proceed to the experiment.

There are five stages in this experiment:

***In stage 1*,** you are firstly required to provide your ID number again. Next, you will take four each of which contains different types of questions. In the first task, you

are asked to indicate the extent to which you agree or disagree with the provided statements. You cannot leave the test until all statements are answered. Once you have every question answered, please click OK to move to the next test.

In the second task, you are supposed to input your answers to blank boxes provided. You also have to address all of the questions provided. Please click OK to move to the next task once you finish the previous task completely.

In the third task, you are again required to indicate the extent to which you agree or disagree with given statements as you have done in the first task. You must answer all of the statements. Please click OK as soon as you finish them to be taken to task 4.

In the fourth task, you will have 60 seconds to answer each set of math problems. Unlike the first three tasks, you can leave questions unanswered in case you find them difficult; otherwise, you will automatically be taken to the next set of math questions after the end of 60 seconds. Please click OK after you finish a question set so as to move to the very next question set.

In stage 2, you will have time to read the detailed instructions on the game you play:

> "You are interacting with 2 others, randomly assigned participants in one group. *There are 3 people in each group. Group formation is made on a random process. As the game starts, each group member is endowed with an amount of 20 experimental currency units (ECUs). Next, the members in a group decide how much to contribute to the public good (the contributing amount can vary between 0 and 20 and can be in decimal places). The total contribution is then multiplied by a multiplier of 1.5 to arrive at the group's final output. The group's final output is then equally shared among members. Any amount of ECUs kept by individual group members is not multiplied by 1.5. Participants' earnings are accumulated throughout periods and converted into real cash using the above stated conversion ratio at the end of experiment"*

In stage 3, all participants are going to be divided into 6 different groups at random. There are 3 members in each group. You will be notified of which group you belong to. Please click OK to be taken to the next stage.

In stage 4, you and your group members will now play the game described in stage 2. Each of you is initially endowed with 20 ECUs and you will have to decide how much to contribute to the public good. Please input the amount you wish to contribute into the blank box provided (*Figure 1*). If you want to indicate decimal places, please use '.' and not ',' (e.g. 18.5 or 10.6).

The amount each group member contributes to the public good is summed up and then multiplied by 1.5 to arrive at the group's final output. The multiplied amount will be equally shared between group members. The share each group member is going to receive is displayed in the next stage. The amount individual group members do not send, they can keep for themselves. The kept amount is not multiplied by 1.5.

Please click OK to move to the next stage.

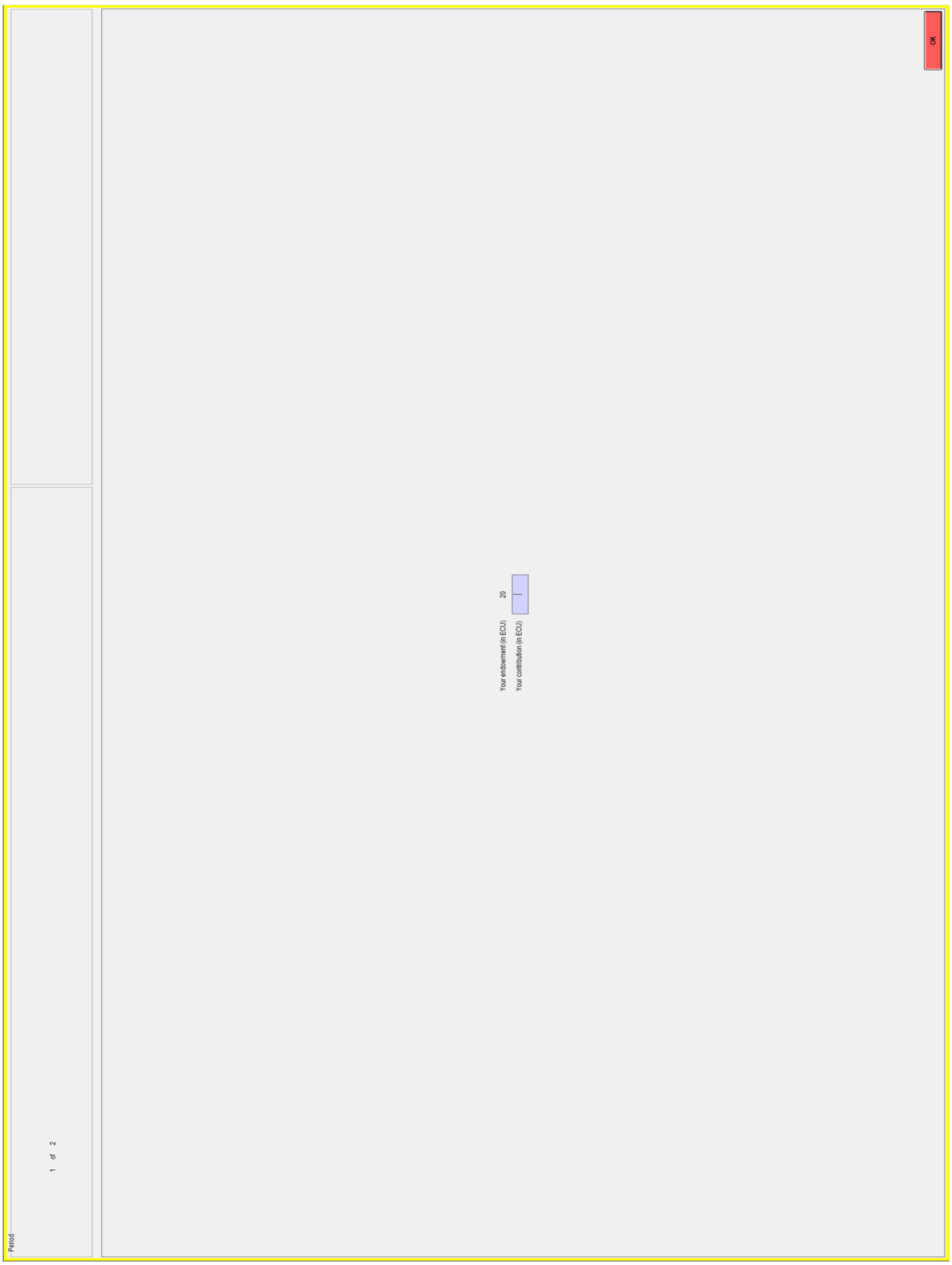


***Figure 1*:** Contribution to the Public Good

In stage 5, you will be shown of how much you have received in the current period of the experiment. The amount you receive (your share of the group's final output) within the current period is calculated by dividing the group's final output by three.

Your profit in the current period is calculated by the following formula:

Profit for the period = Initial endowment – Contribution + Share of the group's final output

The accumulated profit of yours up to the current period is also displayed so that you know how much you have earned up to the experimental period you are in.

As you can see from *Figure 2*, the group's total output is 73.5 ECUs. As a member of this group, you will receive a share of 24.5 ECUs (73.5/3). In addition, your profit for the period is 30.5 ECUs, which results from the following simple calculation:

Profit= 20 ECUs – 14 ECUs + 24.5 ECUs = 30.5 ECUs

Your accumulated profit up to the first period is, of course, equal to your first period's profit and equal to 30.5 ECUs.

Next, you click on the OK button at the bottom right of your computer screen. You will be then taken back to stage 4 to play the game again.

Figure 2: Showing the payoffs

---THE END---

b) Treatment *LP*

Welcome to the Centre for Research in Behavioural Science (CRIBS) at the University of Nottingham, UK.

Thank you for your participation. Your choice and decision during the experiment will be kept confidential and are only used for research purposes. In this experiment, you have to select the leaders, decide how much to contribute to the public good, and evaluate your leaders. If you follow the instructions properly and make good decisions, you might earn a considerable amount of experimental currency units (ECUs), which will be converted into cash at the end of the experiment using the following exchange rate:

108 ECUs = £1

Before the experiment starts, you will be asked to fill in some online surveys. Each of you will be allocated a link to the surveys where you are expected to provide your ID numbers and answer all of the questions given. Then, you will proceed to the experiment.

There are ***eight stages*** in this experiment:

In stage 1, you are firstly required to provide your ID number again. Next, you will take four each of which contains different types of questions. In the first task, you are asked to indicate the extent to which you agree or disagree with the provided statements. You cannot leave the test until all statements are answered. Once you have every question answered, please click OK to move to the next test.

In the second task, you are supposed to input your answers to blank boxes provided. You also have to address all of the questions provided. Please click OK to move to the next task once you finish the previous task completely.

In the third task, you are again required to indicate the extent to which you agree or disagree with given statements as you have done in the first task. You must answer all of the statements. Please click OK as soon as you finish them to be taken to task 4.

In the fourth task, you will have 60 seconds to answer each set of math problems. Unlike the first three tasks, you can leave questions unanswered in case you find them difficult; otherwise, you will automatically be taken to the next set of math questions after the end of 60 seconds. Please click OK after you finish a question set so as to move to the very next question set.

In stage 2, you will have time to read the detailed instructions on the game you play:

> **"***There are 4 people within a group including 3 members and 1 leader. The process to form a group and select the leader is detailed in stage 5. At the beginning of the game, which is in stage 6, each group member is endowed with an initial endowment of 20 experimental currency units (ECUs). Next, they decide how much to contribute to the public good. The total contributed amount is then multiplied by a multiplier of 1.5 to arrive at the group's final output. The group's final output is then equally distributed back to group members in stage 7".*

Also, in this stage, all of you are asked to write a short paragraph of no more than 500 characters to tell other group members if you want to become a leader and why you should be selected as a leader. Please click OK once you finish writing.

In stage 3, 5 individuals are randomly selected to be potential group leaders. However, at this stage, they are yet to be assigned to lead any group. You will be notified of whether you are selected as leaders or not. Non-selected participants will be formed into three groups each of which contains three people. The group members are matched at random and you are informed of which group you are assigned to. Please click OK once you have known your group number.

In stage 4, members of each group will have chance to read all 5 abstracts written by 5 potential leaders. These abstracts will be shown to you again in the next stage, so you do not have to worry if you have not read all of the abstracts in detail. Please click OK once you complete your reading.

In stage 5 is divided into two sub-stages. In the first sub-stage, each member in each group will make offer to each of the 5 potential leaders. Each offer is denominated in percentage and lies within the range of 0% and 10% of the group's final output. Hence, the total offer that each group makes for a potential leader is summed up to 30% of the produced final output of that group.

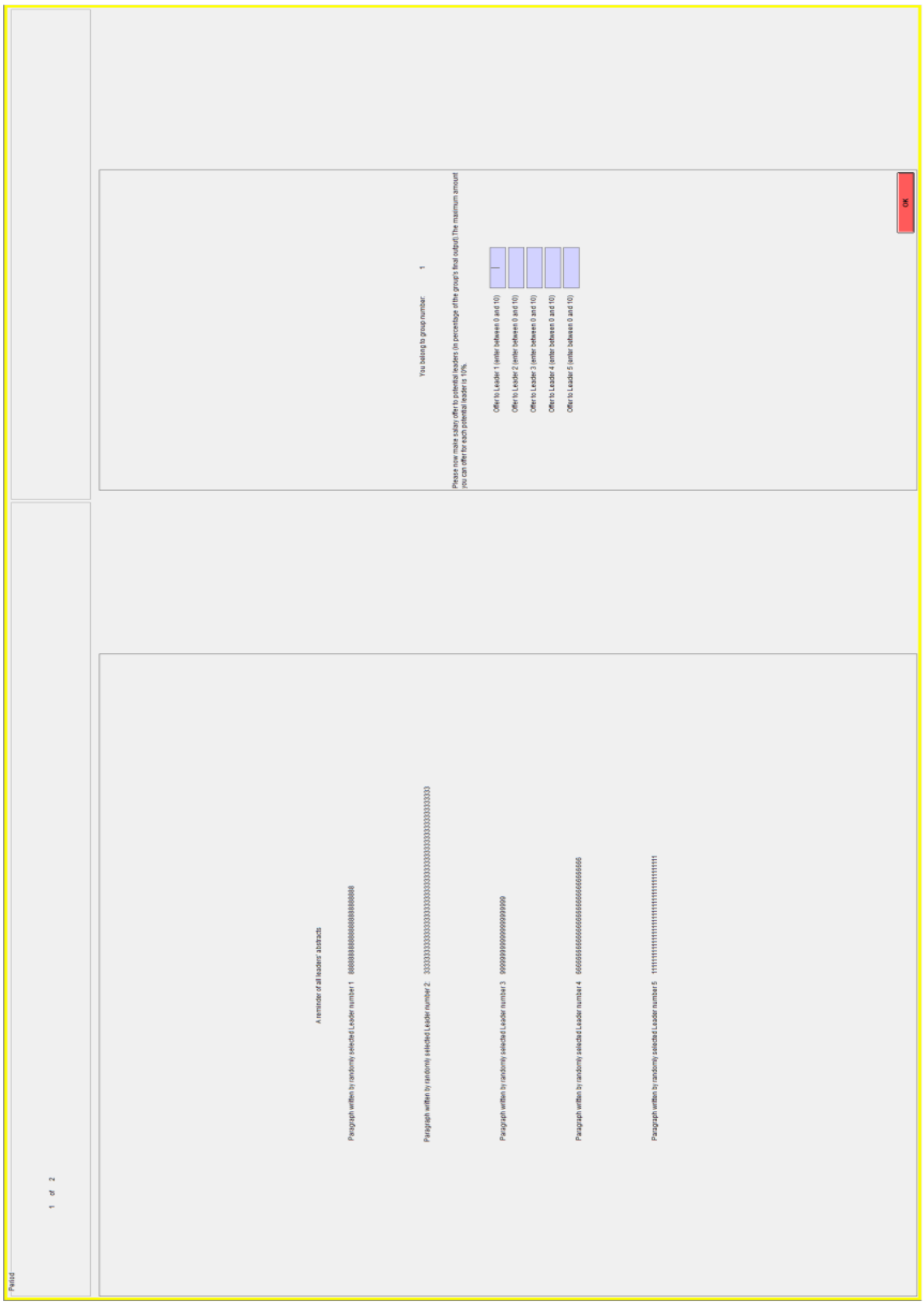


Figure 1: Making offers to Leaders

As you can see from the screenshot above, you can enter any number from 0 to 10 into relevant boxes for potential leaders (0 equals to 0% and 10 equals to 10%). On the left hand side is the reminder of all potential leaders' abstracts, which facilitate you to make better choices of leaders.

The total amount each potential leader receives from a group is equal to the sum of all offers made by members of that group. For example, the first member of group 1 offers 10% of the group's final output to leader 1 while the second member offers 6% of the group's final output to leader 1. In addition, the third member makes an offer 9% of the group's final output to leader 1. Hence, in total, the offering amount of group 1 to leader 1 is 25% of group 1's final output. The more your group offers to a potential leader, the more likelihood she will choose your group to lead.

In the second sub-stage, all potential leaders will observe the aggregated offers made by all experimental groups and decide which group they prefer to lead. As there are 3 groups and up to 5 potential leaders, two leaders, who are not chosen as leaders, will end this sub-stage without being able to choose any group. In other words, the group selection process occurs on a first-come-first serve basis and the two leaders with no groups end their experiment here. In case there are not enough leaders for all groups, leaders are selected on random basis and be allocated to groups without leaders yet. Randomly selected leaders, however, can only receive participation fees at the end of the experiment.

In stage 6, after the formation of all groups is completed, the game starts as described in stage 2. Each individual will be endowed with 20 ECUs in every period. You will have to decide how much out of this endowment to contribute to the public good. Your group leader will not contribute to the public good. Please click OK once you have provided your contribution.

In stage 7, group members and leaders will have chance to observe groups' final outputs and their earnings for the current period. They also can observe their accumulated profits up to the period they are in. Leaders, especially, can also see the contribution of each group member in the game in stage 6.

It is important to note that, each group member receives a fixed payment of 10% of the group's final output and, hence, 30% of the final output for all three group members. This amount can be used to pay selected leaders the offered salaries that each group member has committed to paying in ***stage 5***. Besides, each group member also receives an equal share out of the remaining 70% of the final output. To illustrate, we look at a group in the following example. The group has the final output of 100 ECUs. Each group member will receive 10% of this amount meaning that each obtains 10 ECUs for sure. Now, the remaining output shall be 70 ECUs, which is now distributed equally among 3 group members. Hence, the total money an individual member earns in a period is:

10 ECUs + 70/3 ECUs – Offering amount to the leader (in ECUs)

Also, in this stage, group members can express their happiness with their current leader (*Figure 2*).

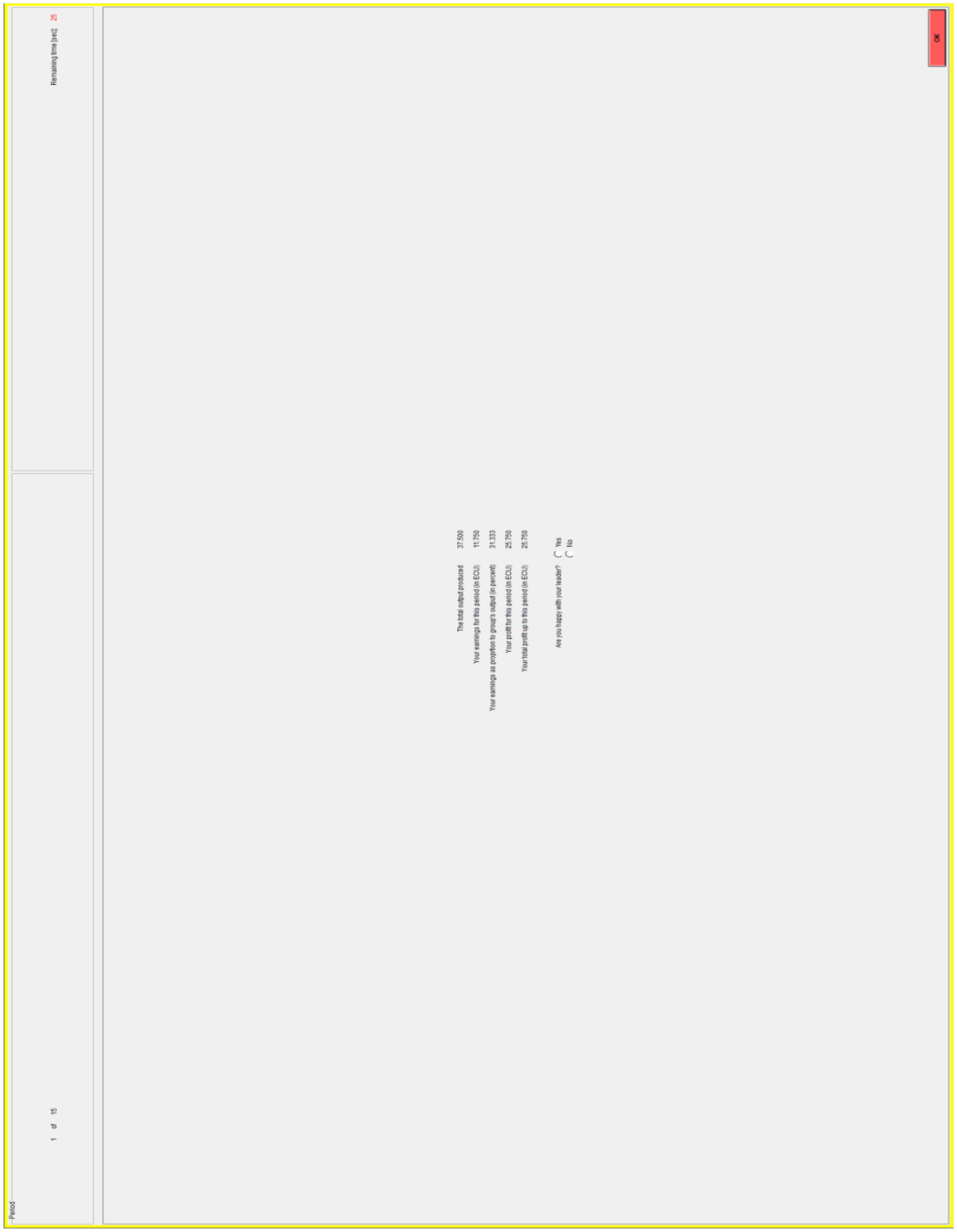


Figure 2: Display of Group's Outcome and Evaluation of Satisfaction with Leaders

Regarding the leader, s/he will only receive the offered amount that all group members propose to her in stage 5.

After this stage, you will be taken back to stage 6 to play the contribution game. You are supposed to repeat stages 6 and 7 for multiple periods.

After you finish stage 7, you will proceed to **stage 8** where you can decide if you want to keep or remove your current leader. If you decide to remove your current leader, you will be asked who you wish to select as your new leader by indicating a number in the relevant box. So as to aid you make a better choice of leaders, we will provide you a reminder of all leaders' written abstracts as well.

---THE END---

c) Treatments *LA* and *LAH*

Welcome to the Centre for Research in Behavioural Science (CRIBS) at the University of Nottingham, UK.

Thank you for your participation. Your choice and decision during the experiment will be kept confidential and are only used for research purposes. In this experiment, you have to select the leaders, decide how much to contribute to the public good, and evaluate your leaders. If you follow the instructions properly and make good decisions, you might earn a considerable amount of experimental currency units (ECUs), which will be converted into cash at the end of the experiment using the following exchange rate:

108 ECUs = £1

Before the experiment starts, you will be asked to fill in some online surveys. Each of you will be allocated a link to the surveys where you are expected to provide your ID numbers and answer all of the questions given. Then, you will proceed to the experiment.

There are ***nine stages*** in this experiment:

In stage 1**,** you are firstly required to provide your ID number again. Next, you will take four each of which contains different types of questions. In the first task, you are asked to indicate the extent to which you agree or disagree with the provided statements. You cannot leave the test until all statements are answered. Once you have every question answered, please click OK to move to the next test.

In the second task, you are supposed to input your answers to blank boxes provided. You also have to address all of the questions provided. Please click OK to move to the next task once you finish the previous task completely.

In the third task, you are again required to indicate the extent to which you agree or disagree with given statements as you have done in the first task. You must answer all of the statements. Please click OK as soon as you finish them to be taken to task 4.

In the fourth task, you will have 60 seconds to answer each set of math problems. Unlike the first three tasks, you can leave questions unanswered in case you find them difficult; otherwise, you will automatically be taken to the next set of math questions after the end of 60 seconds. Please click OK after you finish a question set so as to move to the very next question set.

In stage 2, you will have time to read the detailed instructions on the game you play:

> **"***There are 4 people in a group. The group consists of 3 team members and 1 leader. The process to form a group and select the leader is detailed in stage 5. At the beginning of the game, which is in stage 6, each group member in each period is endowed with an endowment of 20 experimental currency units (ECUs). Next, the 3 team members in the group will decide on how much to contribute to the public good. The total amount the group contributed is then multiplied by a 1.5 to arrive at the group's final output. The group's final output is then distributed back to each group member by the leader in stage 7. The amounts allocated might differ, depending on what the leader decides for each individual group member. The leader therefore can send different amounts to group members. The leader also does not have to allocate the entire amount of the public good. The leader can keep the output for herself or himself. The salary offers for the leader will still be in place, as proposed in* ***stage 5****".*

Also, in this stage, all of you are asked to write a short paragraph of no more than 500 characters. The paragraph should include the information on whether you aim to become a leader and why you should be selected as leader by the groups. Please click OK to proceed once you finish writing.

In stage 3, 5 individuals are randomly selected to be potential group leaders. However, at this stage, they are yet to be assigned to lead any group. You will be notified of whether you are selected as leaders or not. Non-selected participants will be formed into three groups each of which contains three people. The group members are matched at random and you are informed of which group you are assigned to. Please click OK once you have known your group number.

In stage 4, members of each group will have chance to read all 5 abstracts written by 5 potential leaders. These abstracts will be shown to you again in the next stage, so you do not have to worry if you have not read all of the abstracts in detail. Please click OK once you complete your reading.

In stage 5 is divided into two sub-stages. In the first sub-stage, each member in each group will make offer to each of the 5 potential leaders. Each offer is denominated in percentage and lies within the range of 0% and 10% of the group's final output. Hence, the total offer that each group makes for a potential leader is summed up to 30% of the produced final output of that group.

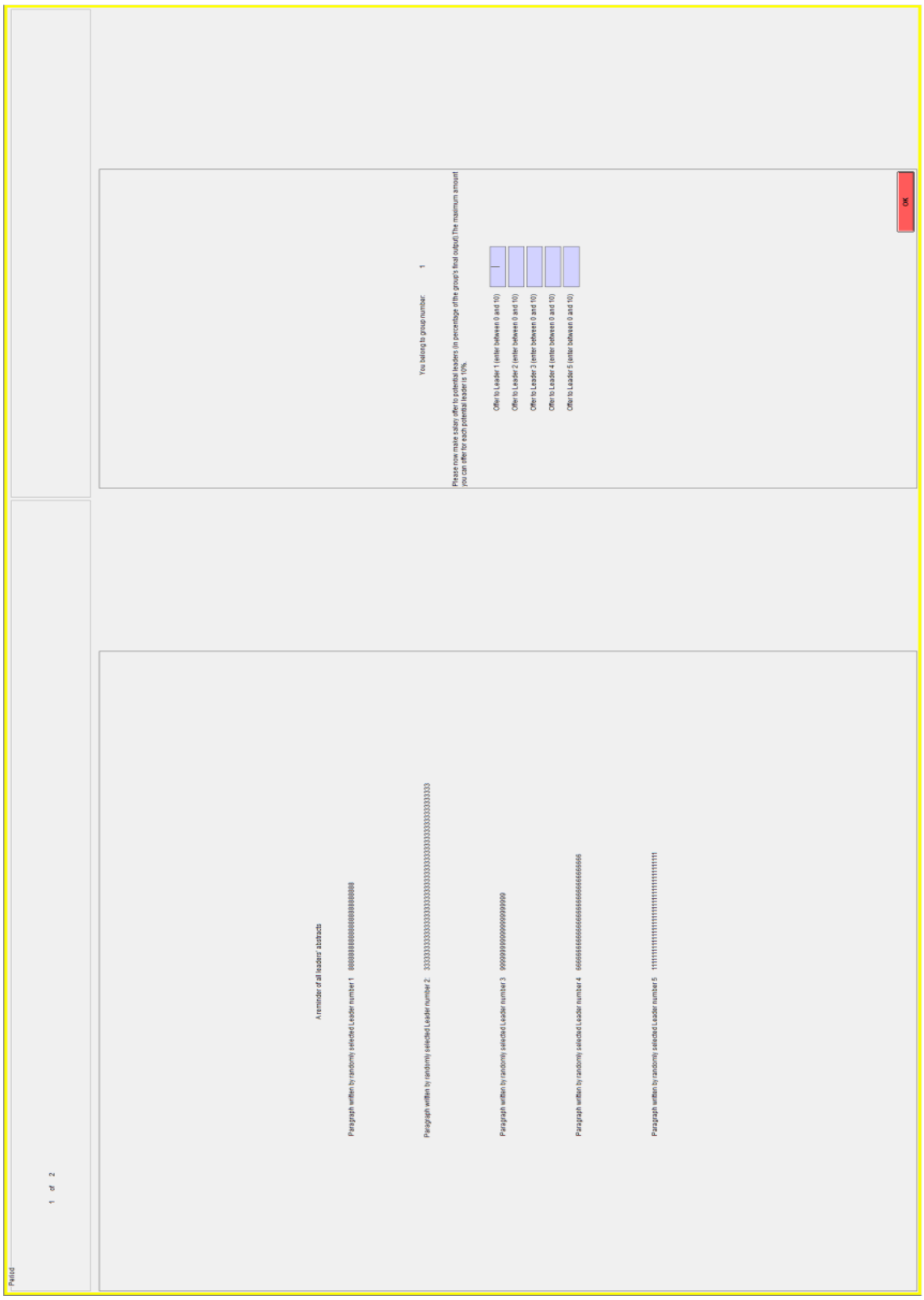


Figure 1: Making offers to Leaders

As you can see from the screenshot above, you can enter any number from 0 to 10 into relevant boxes for potential leaders (0 equals to 0% and 10 equals to 10%). On the left hand side is the reminder of all potential leaders' abstracts, which facilitate you to make better choices of leaders.

The total amount each potential leader receives from a group is equal to the sum of all offers made by members of that group. For example, the first member of group 1 offers 10% of the group's final output to leader 1 while the second member offers 6% of the group's final output to leader 1. In addition, the third member makes an offer 9% of the group's final output to leader 1. Hence, in total, the offering amount of group 1 to leader 1 is 25% of group 1's final output. The more your group offers to a potential leader, the more likelihood she will choose your group to lead.

In the second sub-stage, all potential leaders will observe the aggregated offers made by all experimental groups and decide which group they prefer to lead. As there are 3 groups and up to 5 potential leaders, two leaders, who are not chosen as leaders, will end this sub-stage without being able to choose any group. In other words, the group selection process occurs on a first-come-first serve basis and the two leaders with no groups end their experiment here. In case there are not enough leaders for all groups, leaders are selected on random basis and be allocated to groups without leaders yet. Randomly selected leaders, however, can only receive participation fees at the end of the experiment.

In stage 6, after the formation of all groups is completed, the game starts as described in stage 2. Each individual will be endowed with 20 ECUs in every period. You will have to decide how much out of this endowment to contribute to the public good. Your group leader will not contribute to the public good. Please click OK once you have provided your contribution.

In stage 7, group leaders will have chance to observe the contribution levels of each member in their group before deciding how much of the groups' final output to allocate back to each team member. It is important to note that, each group member has a fixed payment of 10% of the group's final output and, hence, 30% of the final output for all three group members. This amount can be used to pay selected leaders the offered salaries that each group member has committed to paying in ***stage 5***. The leader will be responsible for distributing the remaining 70% of the group's final output to each group member.

Figure 2: Leader allocates output.

As can be seen from *Figure 2* above, each group member has 10% of the group's final output as fixed payment (in this example, 10% of 84 ECUs is 8.4 ECUs). The remaining group's output is, therefore, 70% of 84 ECUs, which equals to 58.5 ECUs, and the leader will enter the percentage of the remaining final output s/he wants to allocate to each team member. The sum for all 3 team members cannot exceed 70% of the group's final output. The amount that is not distributed to the team is transferred to the leader's account. For example, the group's total final output is 84 ECUs, so each group member receives 10%*84 = 8.4 ECUs for sure. The remaining 70% of the group's final output should be 58.5 ECUs. The leader decides to allocate 20% of the group's final output to the first member, 30% of the group's final output to the second member and nothing to the third member. Consequently, s/he distributed 50% of the group's final output to the group members and keeps 20% of the final output for herself (20%*84=16.8 ECUs).

In stage 8, all group members including the leader will be shown the group's final output for the current period, salary for each person in the current period, the ratio of your salary compared to the group's total output in the current period, and accumulated profit up to the current period. The screenshots below illustrate what leader (*Figure 3*) and group members (*Figure 4*) can observe in this stage.

Figure 3: Information of Leader's earnings

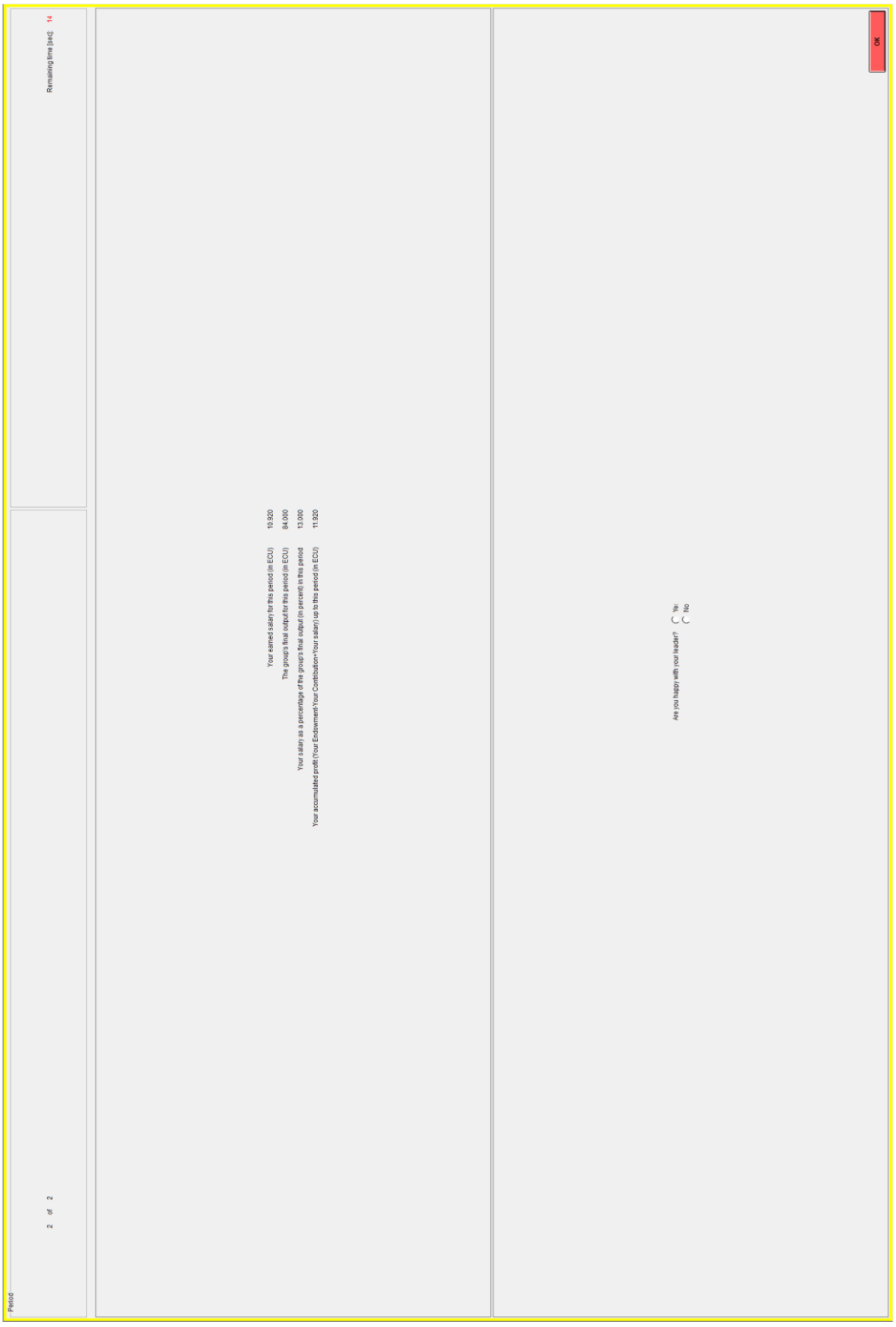


Figure 4: Information of Group Member's earnings and Evaluation of Happiness with Leaders

Group members can express their satisfaction with the current leader by indicating their happiness or unhappiness with the group leader.

After this stage, you will be taken back to stage 6 to play the contribution game again. You are supposed to repeat stages 6, 7 and 8 for multiple periods.

After you finish stage 8, you will proceed to **stage 9** where you can decide if you want to keep or remove your current leader. If you decide to remove your current leader, you will be asked who you wish to select as your new leader by indicating a number in relevant box. We will provide you a reminder of all leaders' written abstracts as well.

---THE END--

d) Treatment *LIC*

Welcome to the Centre for Research in Behavioural Science (CRIBS) at the University of Nottingham, UK.

Thank you for your participation. Your choice and decision during the experiment will be kept confidential and are only used for research purposes. In this experiment, you have to select the leaders, decide how much to contribute to the public good, and evaluate your leaders. If you follow the instructions properly and make good decisions, you might earn a considerable amount of experimental currency units (ECUs), which will be converted into cash at the end of the experiment using the following exchange rate:

108 ECUs = £1

Before the experiment starts, you will be asked to fill in some online surveys. Each of you will be allocated a link to the surveys where you are expected to provide your ID numbers and answer all of the questions given. Then, you will proceed to the experiment.

There are ***nine stages*** in this experiment:

In stage 1, you are firstly required to provide your ID number again. Next, you will take four each of which contains different types of questions. In the first task, you are asked to indicate the extent to which you agree or disagree with the provided statements. You cannot leave the test until all statements are answered. Once you have every question answered, please click OK to move to the next test.

In the second task, you are supposed to input your answers to blank boxes provided. You also have to address all of the questions provided. Please click OK to move to the next task once you finish the previous task completely.

In the third task, you are again required to indicate the extent to which you agree or disagree with given statements as you have done in the first task. You must answer all of the statements. Please click OK as soon as you finish them to be taken to task 4.

In the fourth task, you will have 60 seconds to answer each set of math problems. Unlike the first three tasks, you can leave questions unanswered in case you find them difficult; otherwise, you will automatically be taken to the next set of math questions after the end of 60 seconds. Please click OK after you finish a question set so as to move to the very next question set.

In stage 2, you will have time to read the detailed instructions on the game you play:

> **"***There are 4 people within a group including 3 members and 1 leader. The process to form a group and select the leader is detailed in stage 5. At the beginning of the game, which is in stage 6, each group member is endowed with an initial endowment of 20 experimental currency units (ECUs). Next, they decide how much to contribute to the public good. The total contributed amount is then multiplied by a multiplier of 1.5 to arrive at the group's final output. The group's final output is then equally distributed back to group members in stage 7".*

Also, in this stage, all of you are asked to write a short paragraph of no more than 500 characters to tell other group members if you want to become a leader and why you should be selected as a leader. Please click OK once you finish writing.

In stage 3, 5 individuals are randomly selected to be potential group leaders. However, at this stage, they are yet to be assigned to lead any group. You will be notified of whether you are selected as leaders or not. Non-selected participants will be formed into three groups each of which contains three people. The group members are matched at random and you are informed of which group you are assigned to. Please click OK once you have known your group number.

In stage 4, members of each group will have chance to read all 5 abstracts written by 5 potential leaders. These abstracts will be shown to you again in the next stage, so you do not have to worry if you have not read all of the abstracts in detail. Please click OK once you complete your reading.

In stage 5 is divided into two sub-stages. In the first sub-stage, each member in each group will make offer to each of the 5 potential leaders. Each offer is denominated in percentage and lies within the range of 0% and 10% of the group's final output. Hence, the total offer that each group makes for a potential leader is summed up to 30% of the produced final output of that group.

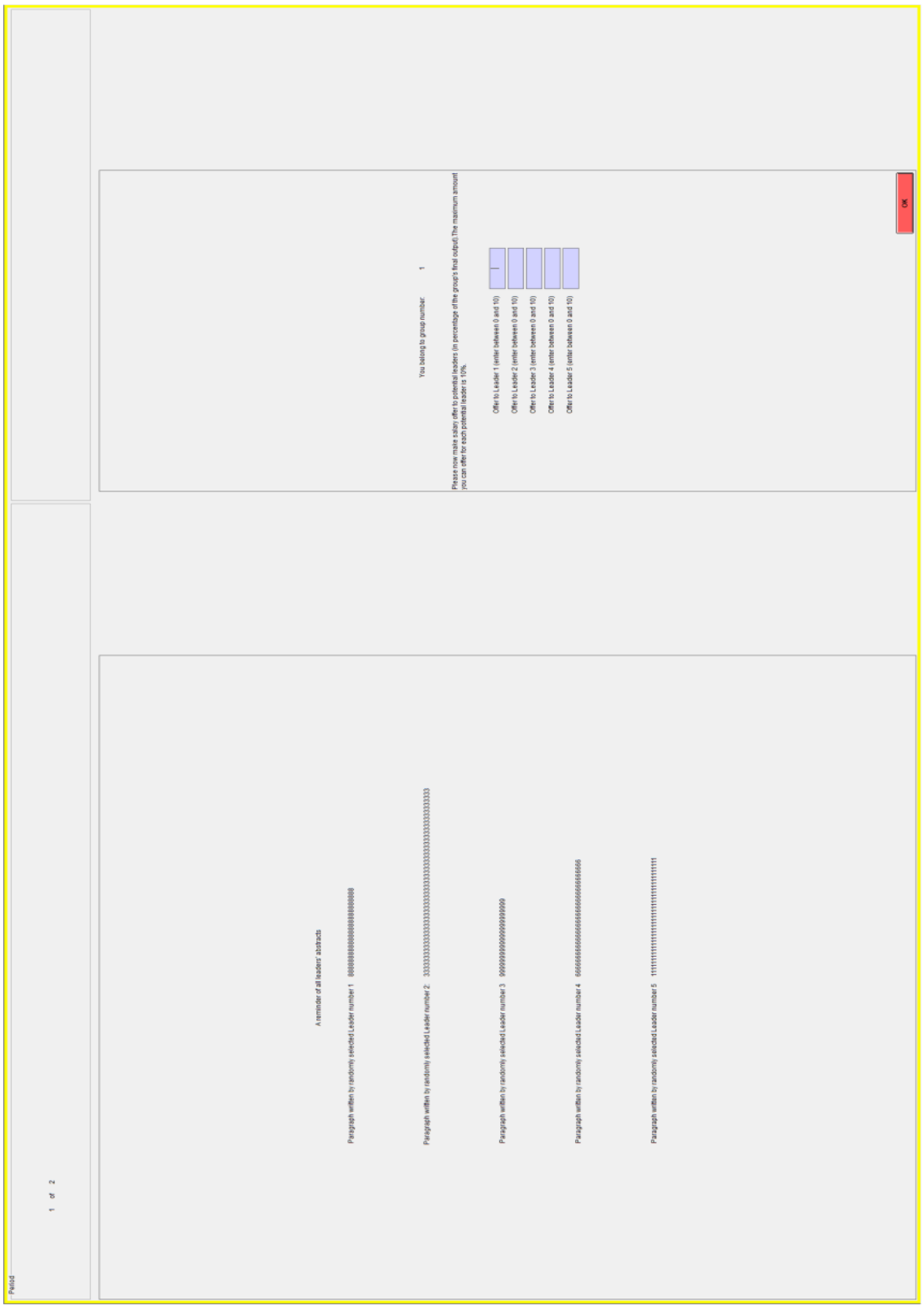


Figure 1: Making offers to Leaders

As you can see from the screenshot above, you can enter any number from 0 to 10 into relevant boxes for potential leaders (0 equals to 0% and 10 equals to 10%). On the left hand side is the reminder of all potential leaders' abstracts, which facilitate you to make better choices of leaders.

The total amount each potential leader receives from a group is equal to the sum of all offers made by members of that group. For example, the first member of group 1 offers 10% of the group's final output to leader 1 while the second member offers 6% of the group's final output to leader 1. In addition, the third member makes an offer 9% of the group's final output to leader 1. Hence, in total, the offering amount of group 1 to leader 1 is 25% of group 1's final output. The more your group offers to a potential leader, the more likelihood she will choose your group to lead.

In the second sub-stage, all potential leaders will observe the aggregated offers made by all experimental groups and decide which group they prefer to lead. As there are 3 groups and up to 5 potential leaders, two leaders, who are not chosen as leaders, will end this sub-stage without being able to choose any group. In other words, the group selection process occurs on a first-come-first serve basis and the two leaders with no groups end their experiment here. In case there are not enough leaders for all groups, leaders are selected on random basis and be allocated to groups without leaders yet. Randomly selected leaders, however, can only receive participation fees at the end of the experiment.

In stage 6, after the formation of all groups is completed, the game starts as described in stage 2. Each individual will be endowed with 20 ECUs in every period. You will have to decide how much out of this endowment to contribute to the public good. Your group leader will not contribute to the public good. Please click OK once you have provided your contribution.

In stage 7, group members and leaders will have chance to observe groups' final outputs and their earnings for the current period. They also can observe their accumulated profits up to the period they are in. Leaders, especially, can also see the contribution of each group member in the game in stage 6.

It is important to note that, each group member receives a fixed payment of 10% of the group's final output and, hence, 30% of the final output for all three group members. This amount can be used to pay selected leaders the offered salaries that each group member has committed to paying in ***stage 5***. Besides, each group member also receives an equal share out of the remaining 70% of the final output. To illustrate, we look at a group in the following example. The group has the final output of 100 ECUs. Each group member will receive 10% of this amount meaning that each obtains 10 ECUs for sure. Now, the remaining output shall be 70 ECUs, which is now distributed equally among 3 group members. Hence, the total money an individual member earns in a period is:

10 ECUs + 70/3 ECUs – Offering amount to the leader (in ECUs)

Also, in this stage, group members can express their happiness with their current leader (*Figure 2*).

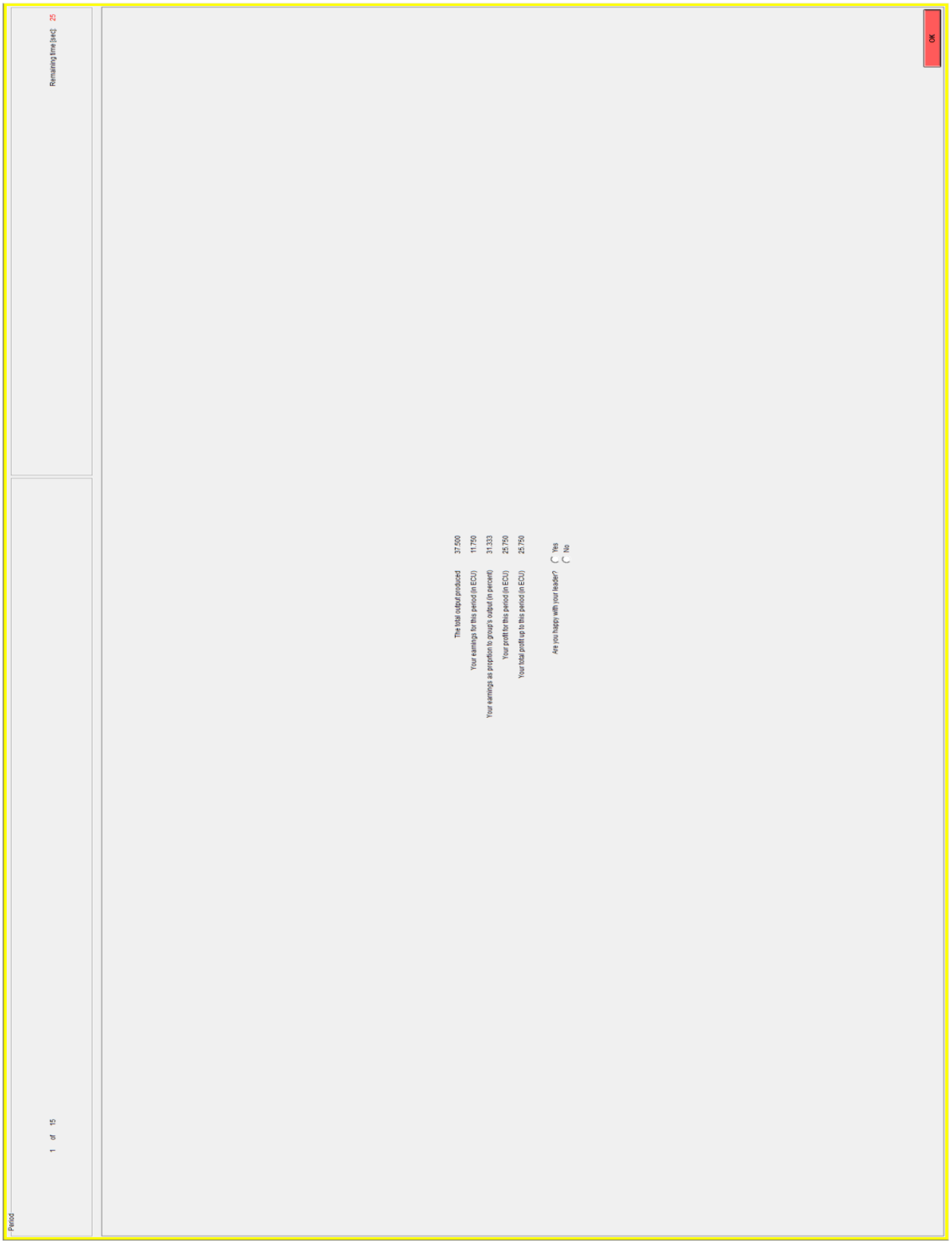


Figure 2: Display of Group's Outcome and Evaluation of Satisfaction with Leaders

Regarding the leader, s/he will only receive the offered amount that all group members propose to her in stage 5.

In stage 8, leaders are asked to compose messages and send these messages to group members. They are free to write anything they wish to communicate with their team but it is noticed that leaders have to write different messages for each group members. Once finished, leaders click OK to send the messages.

Leaders' messages appear on group members' screens as soon as the leaders click OK. After reading the messages, group members click OK to proceed.

After this stage, you will be taken back to stage 6 to play the contribution game. You are supposed to repeat stages 6, 7 and 8 for multiple periods.

After you finish stage 8, you will proceed to **stage 9** where you can decide if you want to keep or remove your current leader. If you decide to remove your current leader, you will be asked who you wish to select as your new leader by indicating a number in relevant box. We will provide you a reminder of all leaders' written abstracts as well.

---THE END---

e) Treatments *LCC* and *LCCH*

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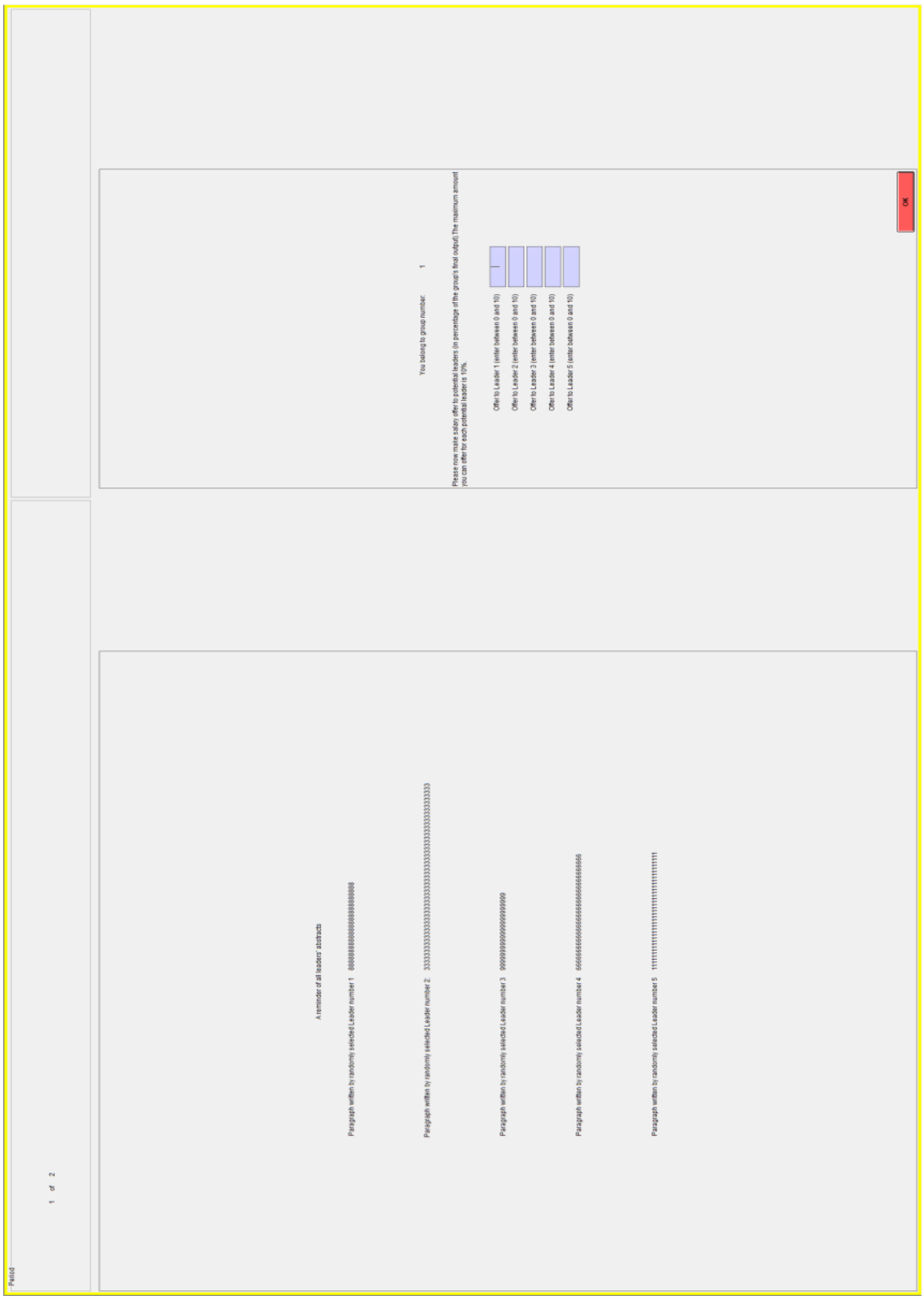


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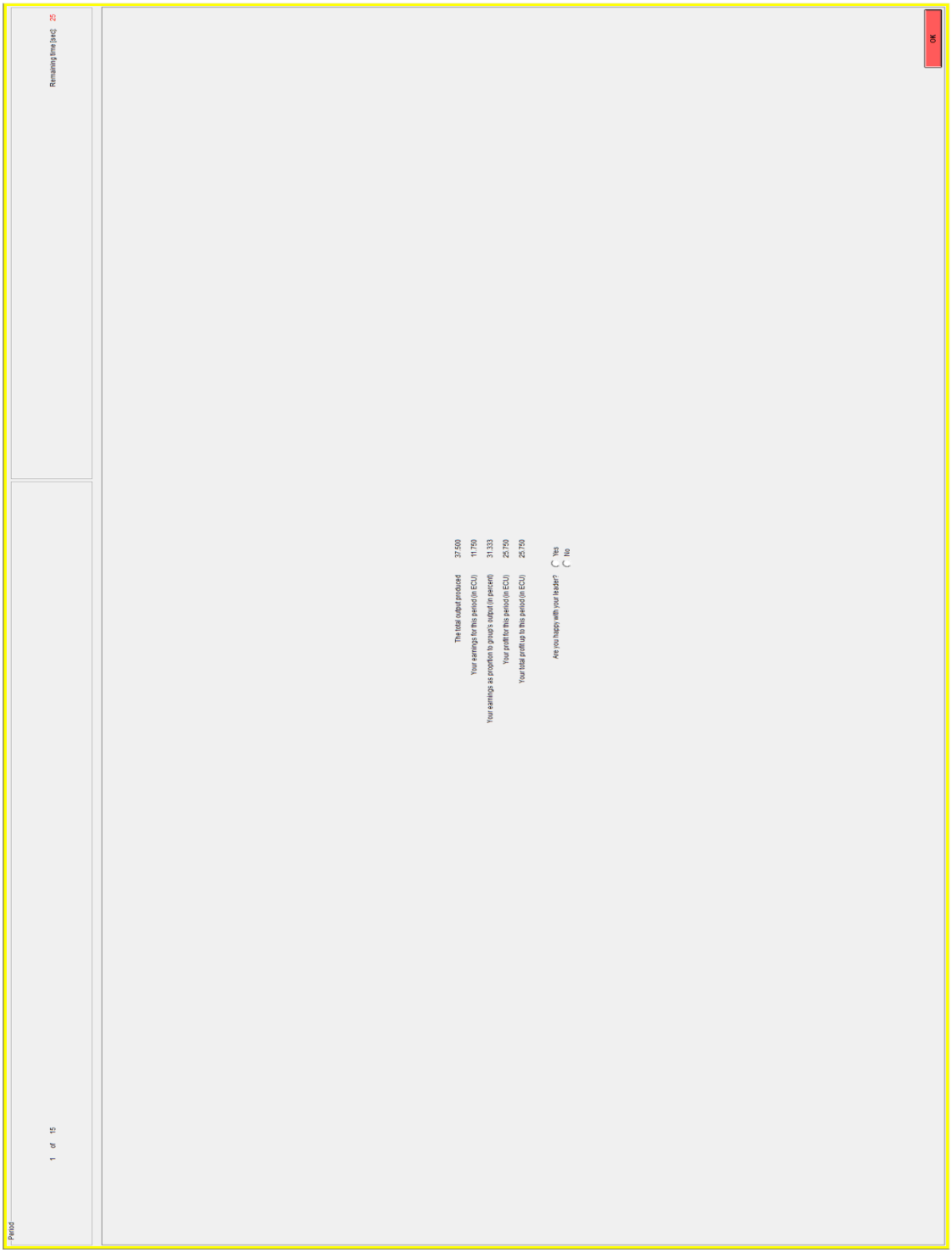


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---THE END---