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or Communication**

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Complicity without Connection or Communication*

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Abstract

We use a novel experiment to investigate whether people aim to coordinate when, to do so, they have to lie; and are more willing to lie when, in doing so, they are aiming to coordinate with a potential accomplice, i.e., another with whom coordination would be beneficial and who is facing the same individual and mutual incentives and the same moral dilemma. We find that people often aim to coordinate when they have to lie to do so and that having a potential accomplice increases willingness to lie even when that potential accomplice is a stranger and communication is not possible.

KEYWORDS: complicity, lying, coordination, die rolling task

JEL classifications: C900, C910, C920, D83

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1. Introduction

People often manage to coordinate with strangers and without communicating. In this paper we investigate whether strangers aim to coordinate in the absence of communication when coordination requires that they behave immorally. Having established that a significant proportion do, we go on to look at whether people are more willing to behave immorally when, in so doing, they are aiming to coordinate with another facing the same individual and mutual incentives and the same moral dilemma even when that other is a stranger and communication is not possible. Thus, we take a first step towards identifying the minimal social conditions under which complicity can emerge.

Complicity, “the fact or condition of being involved with others in an activity that is unlawful or morally wrong” (Oxford English Dictionary), plays a part in many types of wrongdoing. Like other aspects of immoral behavior, complicity is difficult to observe and study in the field. Yet, instances of wrongdoing involving complicity are often both alarming and surprising when brought to light. For example, in the 1990s an inquiry revealed that many babies had died after heart surgery at the Bristol Royal Infirmary because medical professionals had not been applying appropriate standards of safety and had remained collectively silent about the issue for half a decade. One of the reasons why this case was particularly alarming and surprising was that professionals that one would normally expect to be morally upstanding had become complicit in a cover-up.

Complicity can take various forms. However, the majority of cases share at least two common features. First, the accomplices are in decision-making contexts in which there are opportunities to reciprocate and gain by acting collectively; either by directly assisting one another by lying or by turning a blind eye upon each other’s wrongdoing or in some other way, one accomplice helps the other and knows or anticipates that the other will reciprocate. Second, the accomplices share social ties, i.e., they know each other as colleagues and possibly also as friends.

When studying complicity, it is important to understand whether social ties are necessary or whether there are aspects of human internal motivation that drive people into complicity even in the absence of social ties. This is important because the different foundations call for different public actions. If complicity can only emerge between people who have developed social ties, then interventions that moderate social tie formation and maintenance between colleagues, such as staff rotation (Abbink 2004), should be pursued. However, such interventions will not work if complicity is internally motivated.

To test whether complicity can emerge between strangers in the absence of communication, we designed and conducted a novel laboratory experiment. At the heart of the experiment is the Complicity Game (CG thereafter). In the CG, two anonymous players are randomly paired. Each is asked, simultaneously, to roll a die in private and report the outcome. The report of each player determines the monetary payoff of the other. In addition, each player receives a bonus if both reports are 5 and a higher bonus if both reports are 6. In this game, the

distribution of die roll reports will deviate from the uniform distribution of fair die rolls if the value players place on ensuring high monetary payoffs for themselves and others and on coordinating with others facing the same choice, outweighs any guilt or internalised shame they experience when lying. We are specifically interested in the psychological value placed on coordinating which, in contexts such as this where a moral dilemma exists, we refer to as the *potential accomplice effect*.

To isolate this effect, we also designed and conducted a variant of the game in which there is no potential accomplice and yet everything else, including the altruistic motivation to lie and the subjective distributions of anticipated monetary payoffs conditional on own die roll report, remain unchanged. Finally, one further variant, involving the same monetary incentives as the CG, but direct selection of a number between 1 and 6 rather than the reporting of a die roll, is used to establish that, in the absence of any moral dilemma, people aim to coordinate by choosing 6.

We find that, in the absence of any moral dilemma, 97 percent of players report a 6, i.e., they aim to coordinate on the monetary payoff dominant equilibrium. A significantly lower 59 percent of the players participating in the CG reported a 6, indicating that the moral dilemma had a bearing on their decision-making. Finally, a significantly lower again 41 percent of the players participating in the ‘no potential accomplice’ variant (NAC thereafter) of the game reported a 6. These results indicate that not all, but a significant proportion of people are willing to behave immorally with the aim of coordinating, and having a potential accomplice increases individual willingness to behave immorally even when that accomplice is a stranger and communication is not possible.

Our findings contribute to the growing behavioural and experimental literature on immoral behaviour. In this literature, behaving immorally is associated with an intrinsic, psychological cost (Hurkens and Kartik, 2009; Abeler, Becker and Falk, 2014). However, this cost seems to be context specific. People behave more honestly when they have been religiously or morally primed (Mazar, Amir and Ariely 2008), when they have to report their immoral intentions before they act (Jiang 2013), when deviating from honesty might reduce their own earnings by suppressing others’ effort (Ederer and Fehr 2007), and when immoral actions harm others (Gneezy, 2005; Fischbacher and Föllmi-Heusi, 2013).

Closely related to our study are those of: Conrads, Irlenbusch, Rilke, and Walkowitz (2014) who found that people lie more when the returns to lying must be shared with another; Alempaki, Doğan and Saccardo (2016) who found that senders in a sender-receiver game lie less when the receivers played fairly in a prior dictator game; Weisel and Shalvi (2015) who found that, in a sequential two-player game in which both must lie for each to secure a positive monetary payoff, when the first player lies, the second player reciprocates by also lying; and Kocher, Schudy, and Spantig (2016) who found that communication within a group increases dishonesty. However, none of these prior studies investigate simultaneous coordination involving immoral behavior or isolate the effect of

having a potential accomplice from other pro-social motivations for lying, while at the same time eliminating all possible forms of communication, including signaling intent through choice of action.

The rest of the paper is organized as follows. In section 2 we introduce a theoretical framework for the CG. In section 3 we describe our experimental design and procedures. In section 4 we present the results of two checks pertaining to the internal validity of the experiment. In section 5 we present the main results and in section 6 we conclude.

2. Theoretical Framework

First, consider the version of the game in which there is no die rolling, i.e., in which each of the two players *chooses* a number between 1 and 6 to report, each player's report directly determines the other's monetary payoff, and then a bonus of one or two is added if both report 5 or 6 respectively. This game is represented by the matrix below:

Player B's report:		1	2	3	4	5	6
Player A's report:	1	1 1	2 1	3 1	4 1	5 1	6 1
	2	1 2	2 2	3 2	4 2	5 2	6 2
	3	1 3	2 3	3 3	4 3	5 3	6 3
	4	1 4	2 4	3 4	4 4	5 4	6 4
	5	1 5	2 5	3 5	4 5	6 6	6 5
	6	1 6	2 6	3 6	4 6	5 6	8 8

This game has 18 pure-strategy Nash equilibria² and the monetary payoff dominant equilibrium involves each player reporting a 6. Players in this game are expected to coordinate on the monetary payoff dominant equilibrium (6, 6). We expect this for two reasons. First, while multiplicity of equilibria can lead to coordination failures, it has been shown that, if there is a unique monetary payoff-dominant equilibrium, this is what players tend to focus on and select (Van Huyck, Battalio and Beil, 1990). Second, it has been shown that, when there are multiple equilibria but one is visually and/or intuitively salient, players tend to coordinate on that (Mehta, Starmer and Sugden, 1994); owing to its position and monetary payoff-dominance, in the game above, (6, 6) meets these criteria.

² The Nash equilibria of this game are: (1, 1), (2, 1), (3, 1), (4, 1), (1, 2), (2, 2), (3, 2), (4, 2), (1, 3), (2, 3), (3, 3), (4, 3), (1, 4), (2, 4), (3, 4), (4, 4), (5, 5), (6, 6)

Now, we introduce the die rolling, i.e., we move to the Complicity Game (CG), and consider the various possible psychological costs and benefits that accrue to subjects depending on their reports and how they relate to their die rolls. To formally describe the complete payoff function for players playing the CG, we define $\Delta = \{1, 2, 3, 4, 5, 6\}$. Players i ($i = A, B$) individually observe a message made by Nature $O_i \in \Delta$ and, having made the observation, they each report an element of Δ , $R_i \in \Delta$, which may or may not equal O_i . The messages the two players observe are uncorrelated. The strategy space Δ^2 of each player has 36 elements (O_i, R_i) which are all the possible combinations of observation and report. Also, we define $\bar{O}_i \in \Delta$ to be the belief players form about the message made by nature that their co-players' observed.

Let $U_A : \Delta^2 \times \Delta^2 \rightarrow \mathbb{R}$ be the utility function of Player A (Player B's utility function is symmetrically identical) in this game which we assume to be given by:

$$U_A[(O_A, R_A), (\bar{O}_B, R_B)] = [R_B + \delta(R_A, R_B)] + \alpha_A(R_A) - s_A(R_A) - g_A(|R_A - O_A|) + \tau_A \kappa(R_A, O_A, R_B, \bar{O}_B) \quad \text{UF1}$$

The first component of UF1, $R_B + \delta(R_A, R_B)$ is the monetary gain for a Player A, where R_B equals the report of a Player B and $\delta : \Delta^2 \rightarrow \{0, 1, 2\}$ is a function that indicates whether the reports of the two players are both either 5 or 6 given by the following:

$$\delta = \begin{cases} 1 & \text{if } R_A = R_B = 5 \\ 2 & \text{if } R_A = R_B = 6 \\ 0 & \text{if } R_A \neq R_B \text{ or } R_A = R_B < 5 \end{cases}$$

The second component, $\alpha_A(R_A)$, captures *altruism*. Motivated by the literature on altruistic white lies (Erat and Gneezy, 2011; Rosaz and Villeval, 2011), we assume that Player A may derive utility from securing her co-player a higher monetary payoff. We assume that $\alpha_A(R_A)$ is strictly monotonically increasing in the co-player's monetary payoff.³

The third component, $s_A(R_A)$, captures the non-monetary cost associated with *internal shame*. Motivated by Greenberg, Smeets and Zhurakhovska (2015), we define *internal shame* as the personal discomfort individuals experience when they imagine their co-players suspecting them of lying. We assume that $s_A(R_A)$ depends only on Player A's report and is monotonically increasing in that report.

The fourth component, $g_A(|R_A - O_A|)$, captures the feeling of *guilt* an individual experiences when making an untrue report, i.e. a report that does not match Nature's message. Conceptually, this *guilt* component is similar to Abeler, Becker, and Falk's (2014) moral cost of dishonesty and Kartik, Tercieux and Holden's (2014) preference for honesty. We assume that g_A is monotonically increasing in

³ Note that this element would also be relevant when dice are not rolled and reports are chosen.

$|R_A - O_A|$ and that $|R_A - O_A| \in \{0,1,2,3,4,5\}$, i.e., we assume that an individual feels guiltier the greater the distance between the message she observes and her report.

Finally, the last component $\tau_A \kappa(R_A, O_A, R_B, \overline{O_B})$ captures what we described above as the *potential accomplice effect*. We define a potential accomplice as someone with whom it would be advantageous to coordinate and who is exposed to and is expected to react in a similar way to the same incentives and moral dilemma. We assume that this mutual exposure and expected reaction to the same moral dilemma increases an individual's utility by τ_A under the conditions specified by the indicator function $\kappa : \Delta^2 \times \Delta^2 \rightarrow \{0,1\}$ and we specify κ as follows:

$$\kappa = \begin{cases} 1 & \text{if } R_A > O_A \text{ and } R_B > \overline{O_B} \\ 0 & \text{if } R_A \leq O_A \text{ or } R_A > O_A \text{ and } R_B \leq \overline{O_B} \end{cases}$$

According to this component, Player A gains additional utility, τ_A , from reporting a higher number than that which she observed (implied by $R_A > O_A$) if she expects that Player B will respond in a similar way to the dilemma (implied by $R_B > \overline{O_B}$).

According to UF1, players who feel guilt and internal shame when they lie will be disinclined to approach the CG in the same way that they approach the game without die rolling, i.e., they will be less inclined to report 6 with the aim of coordinating. However, any such feelings of guilt and shame will be countered in players who are altruistic and/or who are susceptible to the potential accomplice effect.

One of our empirical objectives is to establish whether the potential accomplice effect is positive, i.e., whether $\tau_A > 0$. We do this by comparing subjects' behaviour in the CG to subjects' behaviour in the NAc variant of the game in which Player B exists but is passive and, hence, not exposed to the moral dilemma. With a slight abuse of notation, this implies that $R_B = \overline{O_B}$ and, thus, that $\kappa = 0$. The NAc variant is designed such that all the other monetary and psychological stimuli are identical to those in the CG.⁴ Consequently, if subjects exhibit higher levels of dishonesty in the CG compared to the NAc, this can be attributed to the existence of a potential accomplice, i.e., to $\tau_A > 0$.

The behavioural literature offers many other elements that we could have built into the utility function. For example, Battigalli and Dufwenberg's (2007) *belief based guilt*, which is increasing in the extent to which a player thinks her actions will disappoint her co-player, could be included as a sub-component of the potential accomplice effect or as a sub-component of internal shame. However, given our objective, which is not to test theory but to identify an effect of decision-making context on willingness to lie, UF1's relatively simple form renders it ideal.

⁴ We check that the design works in this regard in section 4.

3. Experimental Design

3.1.1. The Complicity Game (CG)

Subjects are paired. In each pair there is a Player A and a Player B. The players cannot identify or communicate with each other. Each player is asked to roll a fair six sided die once, in private, and report the outcome to the experimenter by writing it on a slip of paper. Each player's report determines the monetary payoff of the other player in the pair. There are two exceptions to this; if both players report a 5, each gets £5 plus a bonus of £1 and, if both players report a 6, each gets £6 plus a bonus of £2. Play is one-shot and simultaneous.

We included the bonuses for two reasons. First, in many real world examples of complicit lying, the benefits appear to be not just reciprocal but also collective in the sense that, if individuals successfully signal that colleagues are better than they actually are, not only the colleagues but also the organization reaps a reputational benefit. The second reason was to enhance the dominance and focality of (6, 6) and, thereby, increase the ease with which players could coordinate. We could have done this by including a bonus only for (6, 6). However, we conjectured that this might lead to a variety of undesirable effects. For example, rendering (6, 6) too attractive might reduce the likelihood of observing any cross-treatment difference in behavior. Or, recalling that Fischbacher and Föllmi-Heusi (2013), and Gächter and Schulz (2016) found that many people tend to lie but not maximally, rendering a report of 6 too attractive could also render it so suspicious that it would rarely be chosen and coordination would become harder to achieve.

3.1.2. The No Moral Dilemma (NMD) treatment (a design check)

The NMD treatment is identical to the CG except that each player simply chooses a number between 1 and 6 and reports his or her choice to the experimenter instead of rolling a die and then deciding what to report to the experimenter.

3.1.3. The No Accomplice (NAc) variant

In the NAc variant, as in the CG, subjects are paired, in each pair there is a Player A and a Player B, the players cannot identify or communicate with each other, Player A's task is to roll a fair six sided die once, in private, and report the outcome to the experimenter, and Player A's report determines the monetary payoff of Player B. The difference between the CG and the NAc is that Player B is passive in the game and Player A's monetary payoff is determined as follows. After Player A reports her die roll, she is asked to randomly draw a report from the set of all reports made during a prior session in which (other) subjects played the CG. The report she draws determines her own monetary payoff and, if her report and her draw are both 5 or both 6, she and Player B get a bonus of £1 or £2 respectively.

In this variant of the game Player A has no potential accomplice because Player B is passive and this, essentially, "turns off" the last component in the utility function UF1. However, the altruistic motivation for Player A to lie, the guilt that Player A might feel if she lies, and the internal shame that Player A might feel

when imagining what Player B might infer from receiving a high monetary payoff, are no different from the CG.

The variant was also designed to hold one other factor, the subjects' *ex ante* subjective distributions of anticipated monetary payoffs conditional on their own decisions, constant relative to the CG. Our starting point, when thinking about how to achieve this was Bohnet and Zeckhauser's (2004) experiment designed to isolate and measure betrayal (of trust) aversion. In their experiment the trusters and trustees in one treatment and the gamble choosers in the other, made either-or decisions. This being the case, Bohnet and Zeckhauser (2004) could effectively hold all other things, except the existence of the trustees but including the trusters' *ex ante* subjective distributions of monetary payoffs conditional on their own decisions, constant by asking the trusters and gamble choosers for their "minimum acceptable probabilities (MAPs) of getting the good outcome such that they would prefer the chance to the sure payoff" (p.467). In this context, betrayal aversion manifests as trusters reporting higher MAPs relative to gamble choosers. In the CG, play is simultaneous and each player has to choose one of six possible reports. Thus, we had to devise an alternative to Bohnet and Zeckhauser's (2004) MAPs approach to holding *ex ante* subjective distributions of monetary payoffs conditional on own decisions constant, while eliciting the players' decisions. In addition, like Bohnet, Greig, Herrman, and Zeckhauser (2008), we were interested in the specific effect of the presence of an *active* player in a particular role in a game, while all other social motivations are held constant, so we replaced the potential accomplice in the CG with a passive player in the NAc, rather than having no second player at all.

Our alternative to Bohnet and Zeckhauser's (2004) and Bohnet et al's (2008) MAPs approach could be less effective at psychologically eliminating the active co-player from the decision-making context. We do, after all, tell the Player As in the NAc variant that the set of reports from which they make their random draws were chosen by players who participated in a prior CG session. While this is a concern, it is important to note that this could not drive a significant result in support of a positive potential accomplice effect; if anything, it would reduce the chances of us isolating such an effect.

3.2. Elicitation of active players' beliefs about the distributions of decisions that would determine their monetary payoffs

The internal validity of this experimental design depends critically on the *ex-ante* subjective distributions of the active players' anticipated monetary payoffs, conditional on those players' decisions, being constant across the CG and the NAc variant. To check that this was the case, at the end of each session of the CG and the NAc variant, we invited players to participate in an un-incentivized belief elicitation exercise in which they were asked to guess how many out of 30 participants in the CG would make a report of 1, 2, 3, 4, 5, and 6. If the, thus elicited, beliefs of active players under the CG and NAc variant are statistically

indistinguishable, we can infer that so too were their subjective distributions of their anticipated monetary payoffs, conditional on their own decisions.

3.3. Experimental Procedures

The experiment was conducted at the CeDEx laboratory, University of Nottingham, in May 2015. In total, 294 students, recruited through ORSEE (Greiner 2004), participated in the CG, NAc variant, and NDM treatment. Of these, 63% were females. We ran 3 sessions of the CG, 6 sessions of the NAc variant, and 1 session of the NDM (design check) treatment. Each session lasted approximately 40 minutes and each participant earned between £1 and £8 plus a show up fee of £2. The smallest session was run with 24 subjects and the largest with 30 subjects. We started by running two sessions of the CG, one of which generated the reports used to determine the monetary payoffs for the Player As in the NAc sessions,⁵ then we randomised the treatments across the remaining sessions.

The games were conducted using die, cups, pens, paper and envelopes. Participants were paired before they made their reports and double blind procedures were maintained throughout. The neutrally framed instructions were presented to the participants both verbally and in writing. The participants' understanding was tested prior to them proceeding to the game.⁶

4. Internal Validity Checks

In this section, we exploit two features of the experimental design to establish the experiment's internal validity.

4.1. Establishing a Coordination Benchmark

The internal validity of our experimental design depends on subjects aiming to coordinate on (6, 6) in the absence of any moral considerations. This needs to be checked empirically because, while (6, 6) is the monetary payoff dominant equilibrium, the CG, assuming no moral considerations, has multiple equilibria. We included the NDM treatment in our design to facilitate such a check. The data

⁵ 30 die roll reports had to be generated by subjects participating in an early session of the CG before we could start running NAc variant sessions. Anticipating that turnout for the first session of the CG could be less than 30 subjects, we scheduled two consecutive sessions of the CG before scheduling any NAc variant session. In fact, both of the first two CG sessions had a turnout of 30 players. We tossed a coin to determine that the second session of the CG would be used for the draw in the subsequent NAc sessions.

⁶ If a participant gave one or more wrong answers in the test, a research assistant went through the instructions with them again and, then, the participant retook the test. Between 1 and 3 participants retook the test in each session. The retake rate was statistically indistinguishable across the CG and NAc according to a t-test (p-value= 0.9477).

from the NDM treatment is graphed in Figure 1. It indicates that, in the absence of any moral considerations, subjects choose “6” 97 percent of the time.⁷

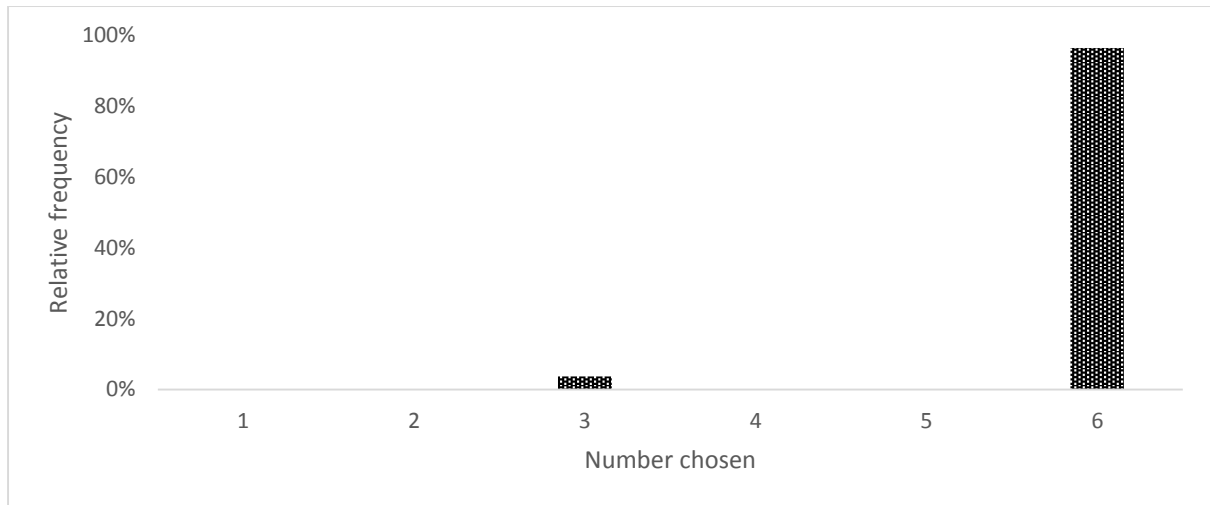


Figure 1: Relative frequencies of numbers chosen in the No Moral Dilemma treatment

4.2. Consistency of beliefs across treatments

The internal validity of our experimental design also depends on the active players under the CG and NAc variant having indistinguishable subjective beliefs about the likelihood of others making each of the possible reports and, hence, indistinguishable *ex-ante* subjective distributions of their own monetary payoffs, conditional on their own decisions.

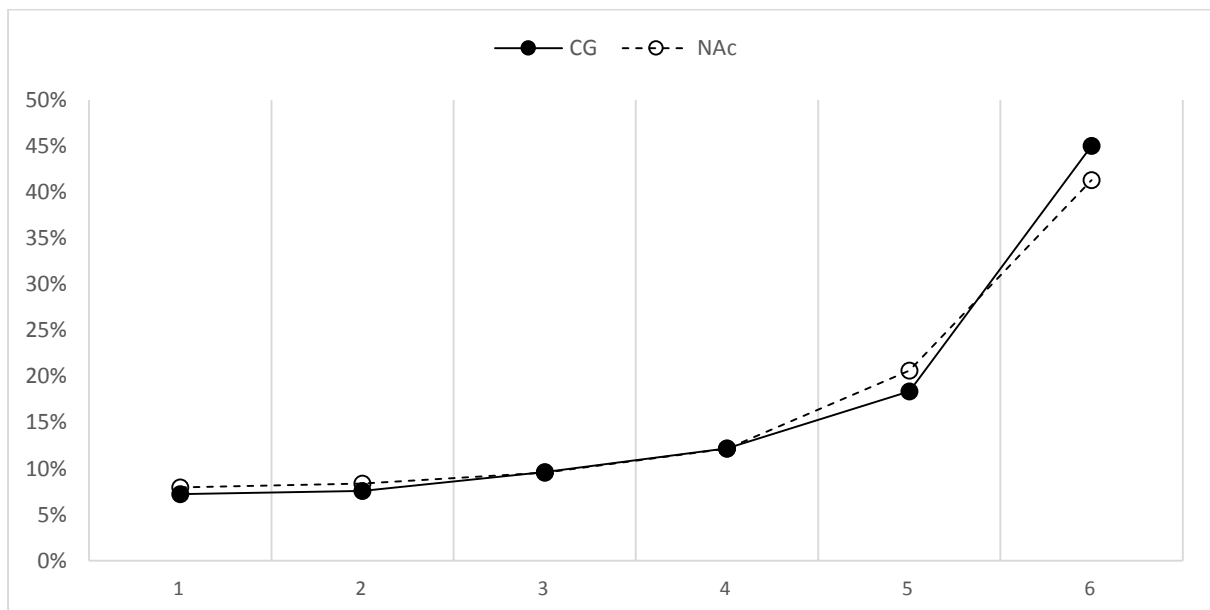


Figure 2: Elicited beliefs about the distribution of reports under the CG and the NAc variant

⁷ Exactly 29 out of 30 players reported a 6.

Figure 2 presents the elicited belief distributions averaged across, in the case of the solid line, all the participants in the CG and, in the case of the dotted line, all the active participants in the NAc variant. The figure suggests that there is no difference in players' beliefs across the two treatments. According to a multivariate analysis-of-variance we cannot reject the null hypothesis that the distribution of beliefs is identical across the two treatments (p-value 0.338).

5. Main Results

Having established our experiment's internal validity, we turn to our main results. First, by comparing the distribution of die roll reports in the CG to the expected distribution for a fair die, we address the issue of whether strangers aim to coordinate in the absence of communication when coordination requires that they lie. Second, we use the die roll reports made in the CG and NAc variant to test the hypothesis that people are more willing to lie when they have a potential accomplice with whom it would be beneficial to coordinate and who faces the same incentives and is exposed to the same moral dilemma, i.e., that $\tau_A > 0$.

Figure 3 graphs the relative frequencies of the die roll reports made in the CG and the NAc variant. The figure also presents the expected distribution of fair die rolls, which is uniform, with each number expected to arise in approximately 16.7 percent of rolls (dotted line). Table 1 presents the percentages of each die roll report under each treatment.

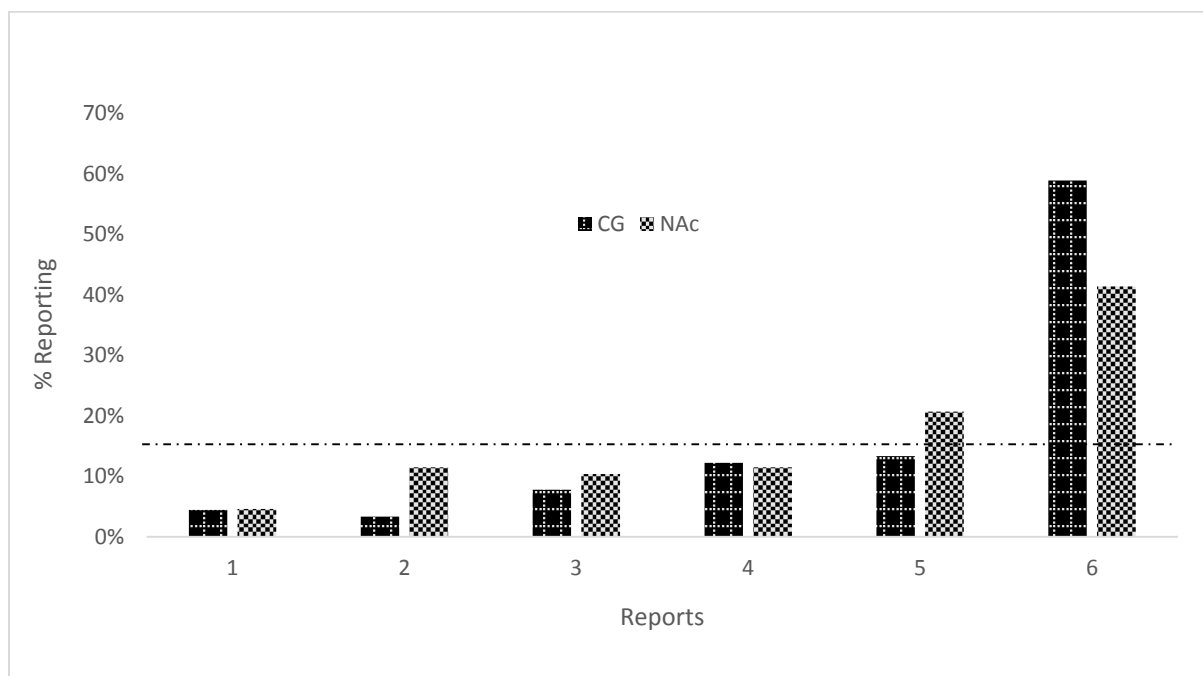


Figure 3: Die roll reports in the CG and the NAc variant

Table 1: Die roll reports in the CG and NAc variant

Die roll report	(1) CG (n=90)	(2) NAc (n=87)	(3) Difference (percentage points)
1	4.44% †††	4.60% †††	-0.16
2	3.33% †††	11.49%	-8.16 *
3	7.78% ††	10.34%	-2.56
4	12.22%	11.49%	0.73
5	13.33%	20.69%	7.36
6	58.89% †††	41.38% †††	17.51 ***
H ₀ : Report distribution same as for fair die			
K-S test	p-value <0.01	p-value <0.01	
H ₀ : Mean reports in CG and NAc the same			
t-test, two-sided			p-value = 0.041
Wilcoxon rank-sum			p-value = 0.023
H ₀ : Report distributions in CG and NAc the same			
K-S test			p-value = 0.100

Notes: In the top panel, columns (1) and (2) report relative frequencies and column (3) reports differences in those relative frequencies; in columns (1) and (2), the significance of the difference between the reported relative frequency and that expected for a fair die according to two-sided binomial tests, adjusted to account for the fact that we perform six tests per distribution (Benjamini and Hochberg, 1995), is also indicated (††† and †† indicate significance at 0.01 and 0.05 respectively); in column (3), the significance of the difference between the treatments according to t-tests, adjusted to account for the fact that we perform six tests, is also indicated (*** and * indicate significance at 0.01 and 0.10 respectively); the second, third and fourth panels describe tests of other hypotheses relating to the die roll distributions and report the results; in the second and fourth panel, K-S indicates Kolmogorov-Smirnov.

5.1. Do strangers aim to coordinate in the absence of communication when coordination requires that they lie?

Figure 3 and Table 1 indicate that 59 percent of the reports made in the CG were 6. This is significantly higher than the 16.7 percent expected in the absence of lying; according to a two sided binomial test, adjusted to account for the fact that we perform six such tests, one for each possible report value (Benjamini and Hochberg, 1995), we can reject the null hypothesis that the percentage of reports of 6 in the CG is consistent with no lying at the 1 percent level. The table also indicates that, in the CG, the frequencies of low-value die rolls were significantly lower than the 16.7 percent expected in the absence of lying. Further, according to a Kolmogorov-Smirnov test, we can reject the null hypothesis that the distribution of reports made in the CG, as a whole, is consistent with no lying at the 1 percent level (p-value<0.01).

Note also that the 59 percent of reports of 6 in the CG is significantly lower than the 100 percent, and the 97 percent of subjects who chose a 6 in the NMD treatment (p-values from unadjusted t-tests < 0.001).

These results indicate that, while many do not, a significant proportion of people aim to coordinate with strangers in the absence of communication when coordination requires that they lie.

5.2. Is there a potential accomplice effect?

Figure 3 and Table 1 also indicate that reports of 6 were more frequent in the CG, at 59 percent, compared to the NAc variant, at 41 percent. According to a two-sided t-test, adjusted to account for the fact that we perform six such tests, one for each possible report value, we can reject the null hypothesis that the proportion of reports of 6 in the CG and the NAc are the same at the 1 percent level. Further, according to a t-test and a Wilcoxon rank-sum test, we can reject the null hypothesis that the mean reports made in the CG and the NAc are the same at the 5 percent level (p-values 0.041 and 0.023 respectively). Only one test, the Kolmogorov-Smirnov test of the null hypothesis that the distributions of reports made in the CG and the NAc are the same, yielded a result on the borderline of significance at the 0.10 level.

These findings are consistent with subjects being more inclined to lie when, *ceteris paribus*, they have a potential accomplice.

6. Conclusion

The objective of this study was to investigate whether strangers aim to coordinate in the absence of communication when coordination requires that they lie and whether people are more willing to lie when, in so doing, they are aiming to coordinate with a potential accomplice, i.e., another person facing the same potential individual and mutual benefits and the same moral dilemma, even when that individual is a stranger and communication is not possible. We conducted an experiment focused on a game, the Complicity Game (CG), in which the two players could maximize their individual and collective earnings only if (except on very rare occasions) they were willing to coordinate by lying.

By comparing the distribution of die roll reports made in the CG to the expected distribution for a fair die, we found that a significant proportion of strangers are indeed able and willing to coordinate in the absence of communication when coordination requires that they lie.

Then, to isolate the effect of having such a potential accomplice in the CG, we also designed and conducted a variant of the game, the NAc variant, in which the one active player had no potential accomplice, but everything else was the same. By comparing the distributions of die roll reports made in the CG and the NAc variant, we found that subjects were more inclined to lie when they had a potential accomplice.

These results indicate that complicity does not depend on familiarity or communication and that, to an extent at least, the emergence of complicity is owing to an innate desire to coordinate with others facing similar incentives even when coordination requires immoral behavior.

These findings are relevant to both the public and the private sector. They suggest that interventions designed to moderate social tie formation and maintenance between colleagues may not be sufficient to eliminate complicit wrongdoing. Measures designed to inculcate moral values within individuals may be the answer, but further research is required.

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APPENTIX

A. Experimental Instructions of the CG.

Welcome to this experiment.

Introductory information

In this experiment you will be asked to perform a task. You will receive a payoff related to this task and a show-up fee of £2. You will be paid in private and in cash at the end of the experiment.

Throughout the experiment, we request that you remain quiet and do not attempt to communicate with other participants. Participants not following this request may be asked to leave without receiving payment. If you have any questions, please raise your hand and an experimenter will come to you.

It is important that you have a good understanding of the experimental instructions. Therefore, please read these instructions carefully. To check that the instructions are clear to you, you will be asked to answer some questions in order to test your understanding. The experiment will start only after everybody has correctly answered the questions.

Task and payoffs

For this task you have been randomly and anonymously paired with another person in this room. In each pair, one participant is labelled Person A and the other Person B. You will learn whether you are Person A or Person B once you open the box on your desk, but you will not learn the identity of the person you are paired with, neither during nor after today's experiment.

Please, do not open your box until you are instructed to do so.

The task of Person A is to roll a die in private and report its outcome. The task of Person B is also to roll a die in private and report its outcome.

Person A's report will determine the payoff of Person B and Person B's report will determine the payoff of Person A. For example, if Person A reports a 2, Person B will receive a payoff of £2 and if Person B reports a 3, Person A will receive a payoff of £3.

There are two exceptions to this: If both persons report a 5, each gets £5 plus a bonus of £1, so a total of £6 and if both persons report a 6, each gets £6 plus bonus of £2, so a total of £8.

The table below displays how the die rolls reported by Person A and Person B affect Person A's and Person B's payoff for the task:

Person B's report:		1	2	3	4	5	6
Person A's report:							
1		£1 £1	£1 £2	£1 £3	£1 £4	£1 £5	£1 £6
2		£2 £1	£2 £2	£2 £3	£2 £4	£2 £5	£2 £6
3		£3 £1	£3 £2	£3 £3	£3 £4	£3 £5	£3 £6
4		£4 £1	£4 £2	£4 £3	£4 £4	£4 £5	£4 £6
5		£5 £1	£5 £2	£5 £3	£5 £4	£6 £6	£5 £6
6		£6 £1	£6 £2	£6 £3	£6 £4	£6 £5	£8 £8

The table has six rows. Each row relates to one of the possible die roll reports that Person A can make.

The table has six columns. Each column relates to one of the possible die roll reports that Person B can make.

The numbers in each box of the table are payoffs. Person A's payoff is always printed in the bottom left-hand corner of the box and Person B's payoff is always printed in the top right-hand corner of the box.

So, if you want to know what the payoff would be if Person A reported a 4 and Person B reported a 5, you look at the box that is in the 4th row and 5th column of the table. In that box, you will see that Person A's payoff in this case is £5 and Person B's payoff is £4.

Take a few moments to familiarise yourself with this table as the questions you will be asked to answer are based on it.

Now, please, answer the following questions and raise your hand when you are finished. An experimenter will come to your booth to check your answers.

Questions to check your understanding

Please, circle the correct answer of every question. You can refer to the table in the instructions when answering these questions.

- 1) If Person A reports 1 and Person B reports 5,
 - Person A's payoff is: 1 2 3 4 5 6 8
 - Person B's payoff is: 1 2 3 4 5 6 8
- 2) If Person A reports 6 and Person B reports 6,
 - Person A's payoff is: 1 2 3 4 5 6 8
 - Person B's payoff is: 1 2 3 4 5 6 8
- 3) If Person A reports 2 and Person B reports 5,
 - Person A's payoff is: 1 2 3 4 5 6 8
 - Person B's payoff is: 1 2 3 4 5 6 8
- 4) If Person A reports a 5 and Person B reports 5,
 - Person A's payoff is: 1 2 3 4 5 6 8
 - Person B's payoff is: 1 2 3 4 5 6 8
- 5) If Person A reports a 4 and Person B reports 1,
 - Person A's payoff is: 1 2 3 4 5 6 8
 - Person B's payoff is: 1 2 3 4 5 6 8

Instructions

In a minute, you will be invited to open your box. Inside the box you will find a die, a cup and an envelope.

If you find a cup with the letter A on it you are Person A, if you find a cup with the letter B on it you are Person B.

You may roll the die openly on the table as many times as you wish to check that it is a fair die. For the die roll you report, please roll the die only **once** and in private by placing the die in the cup, putting the lid on the cup, shaking the cup and putting the cup on the desk. Then, use the hole in the lid of the cup to see the die outcome.

To report the die outcome, open the envelope. Inside it you will find two cards; a report card with numbers from one to six printed on it like the following:

					<i>Your experimental ID</i>	
Report Card						
1	2	3	4	5	6	

Also, an ID card with your ID number printed on it like the following:

ID Card
<i>Your experimental ID</i>

Circle the die outcome on the report card and then place the report card back in the envelope ready for collection. Once you have completed your report, take the die out of the cup and put the die, cup and lid back in the box. **Keep the ID card with you** until the end of the experiment as this will be the connection to your payoff.

An experimenter will come and collect your envelope.

Payment procedure

Once your report cards have been collected, the payoff calculation procedure will begin. While you are waiting for the payoff calculation, we will distribute and ask you to complete a short, anonymous questionnaire. Please leave the questionnaire on your desk once you have completed it. When your payoffs are calculated, an experimenter will come to your booth to hand you a new envelope. Inside that envelope, you will find your payoff in pound sterling and a green receipt. Please sign the green receipt in private and place it in the box that the experimenter will bring to your booth. After signing and placing the green receipt in the box, the experiment is over.

Do you have any questions? If yes, raise your hand and an experimenter will come to you.

Now please open your box.

B. Experimental Instructions of the NAc variant

Welcome to this experiment.

Introductory information

In this experiment you will be asked to perform a task. You will receive a payoff related to this task and a show-up fee of £2. You will be paid in private and in cash at the end of the experiment.

Throughout the experiment, we request that you remain quiet and do not attempt to communicate with other participants. Participants not following this request may be asked to leave without receiving payment. If you have any questions, please raise your hand and an experimenter will come to you.

It is important that you have a good understanding of the experimental instructions. Therefore, please read these instructions carefully. To check that the instructions are clear to you, you will be asked to answer some questions in order to test your understanding. The experiment will start only after everybody has correctly answered the questions.

Information on previous experiment

In this section we describe an experiment that took place here, earlier, involving 30 participants recruited in the same way that you were recruited. We call this experiment, 'Experiment 1'. The experiment you are participating in is not the same as 'Experiment 1'. However, you need to know about 'Experiment 1' because what people did in that experiment will be relevant for your payoff today. The relevance will be explained in the next section of the instructions.

In 'Experiment 1', participants were randomly and anonymously paired. In each pair, one participant was labelled Person A and the other Person B.

The task of Person A was to roll a die in private and report its outcome. The task of Person B was also to roll a die in private and report its outcome.

Person A's report determined the payoff of Person B and Person B's report determined the payoff of Person A. For example, if Person A reported a 2, Person B received a payoff of £2 and if Person B reported a 3, Person A received a payoff of £3.

There were two exceptions: If both Person A and Person B reported a 5, each got £5 plus a bonus of £1, so a total of £6 and if both persons reported a 6, each got £6 plus a bonus of £2, so a total of £8.

The table below displays how the die rolls reported by Person A and Person B affected Person A's and Person B's payoff for the task:

Person B's report:		1	2	3	4	5	6
Person A's report:	1	£1 £1 £1 £1	£2 £1 £2 £2	£3 £1 £3 £3	£4 £1 £4 £4	£5 £1 £5 £6	£6 £1 £6 £8
	2	£1 £2 £1 £2	£2 £2 £2 £2	£3 £2 £3 £3	£4 £2 £4 £4	£5 £2 £6 £6	£6 £2 £6 £8
	3	£1 £3 £1 £3	£2 £3 £2 £3	£3 £3 £3 £3	£4 £3 £4 £4	£5 £3 £6 £6	£6 £3 £6 £8
	4	£1 £4 £1 £4	£2 £4 £2 £4	£3 £4 £3 £4	£4 £4 £4 £4	£5 £4 £6 £6	£6 £4 £6 £8
	5	£1 £5 £1 £5	£2 £5 £2 £5	£3 £5 £3 £5	£4 £5 £4 £5	£5 £6 £6 £6	£6 £5 £6 £8
	6	£1 £6 £1 £6	£2 £6 £2 £6	£3 £6 £3 £6	£4 £6 £4 £6	£5 £6 £6 £6	£6 £8 £6 £8

The table has six rows. Each row relates to one of the possible die roll reports that Person A could have made.

The table has six columns. Each column relates to one of the possible die roll reports Person B could have made.

The numbers in each box of the table are payoffs. Person A's payoff is always printed in the bottom left-hand corner of the box and Person B's payoff is always printed in the top right-hand corner of the box.

So, if you want to know what the payoff was if Person A reported a 4 and Person B reported a 5, you look at the box that is in the 4th row and 5th column of the table. In that box, you will see that Person A's payoff in this case was £5 and Person B's payoff was £4.

Take a few minutes to familiarise yourself with this table and then think about the die roll reports that the participants in Experiment 1 might have made.

Each of the 30 die rolls that were reported in 'Experiment 1' is written on a card and each card has been put in an envelope. All 30 envelopes are in this bowl.

The next section describes the task you are to perform in **this** experiment and how your payoffs will be determined using the reports in this bowl. It is this bowl full of reports that is the connection between Experiment 1 and the task you are going to perform today.

Task and payoffs

For this task you have been randomly and anonymously paired with another person in this room. In each pair, one participant is labelled Person A and the other, Person B. You will learn whether you are Person A or Person B once you open the box on your desk, but you will not

learn the identity of the person you are paired with, neither during nor after today's experiment.

Please, do not open your box until you are instructed to do so.

The task of Person A is to roll a die in private and report its outcome. The task of Person B is to answer a short questionnaire, but this task is irrelevant for the payoff of any participant.

Person A's report will determine the payoff of Person B. For example, if Person A reports a 2, Person B will receive a payoff of £2.

Person A's payoff will be determined as follows: Person A will be asked to draw one of the 'Experiment 1' die roll reports from the bowl. The report Person A draws, will determine her or his payoff.

For example, if Person A draws a report of 3, she/he will receive a payoff of £3.

There are two exceptions to this: If both Person A's report and Person A's draw from the bowl are 5, Person A and Person B each get £5 plus bonus of £1, so a total of £6 and if both Person A's report and Person A's draw are 6, Person A and Person B each get £6 plus bonus of £2, so a total of £8.

Notice, that this task is similar but not the same as the task in 'Experiment 1'. The critical difference is that here today the Person Bs do not make reports. Only Person A's report and Person A's draw from the bowl will determine Person A's and Person B's payoff.

The table below displays how the die roll reported by Person A and Person A's draw from the bowl affect Person A's and Person B's payoffs for the task:

Person A's draw:		1	2	3	4	5	6
Person A's report:							
1	£1	£1	£2	£3	£4	£5	£6
2	£1	£2	£2	£3	£4	£5	£6
3	£1	£3	£3	£3	£4	£5	£6
4	£1	£4	£4	£4	£4	£5	£6
5	£1	£5	£5	£5	£5	£6	£6
6	£1	£6	£6	£6	£6	£6	£8

The table has six rows. Each row relates to one of the possible die roll reports that Person A can make.

The table has six columns. Each column relates to one of the possible numbers that Person A can draw.

The numbers in each box of the table are payoffs. Person A's payoff is always printed in the bottom left-hand corner of the box and Person B's payoff is always printed in the top right-hand corner of the box.

So, if you want to know what the payoff would be if Person A reported a 4 and drew a 5, you look at the box that is in the 4th row and 5th column of the table. In that box, you will see that Person A's payoff in this case is £5 and Person B's payoff is £4.

Take a few moments to familiarise yourself with this table as the questions you will be asked to answer are based on it.

Now, please, answer the following questions and raise your hand when you are finished. An experimenter will come to your booth to check your answers.

Questions to check your understanding

Please, circle the correct answer of every question. You can refer to the table in the instructions when answering these questions.

1) If Person A reports 1 and draws a 3,

- Person A's payoff is: 1 2 3 4 5 6 8
- Person B's payoff is: 1 2 3 4 5 6 8

2) If Person A reports 6 and draws a 6,

- Person A's payoff is: 1 2 3 4 5 6 8
- Person B's payoff is: 1 2 3 4 5 6 8

3) If Person A reports 2 and draws a 5,

- Person A's payoff is: 1 2 3 4 5 6 8
- Person B's payoff is: 1 2 3 4 5 6 8

4) If Person A reports 5 and draws a 5,

- Person A's payoff is: 1 2 3 4 5 6 8
- Person B's payoff is: 1 2 3 4 5 6 8

5) If Person A reports a 4 and draws a 1,

- Person A's payoff is: 1 2 3 4 5 6 8
- Person B's payoff is: 1 2 3 4 5 6 8

Instructions

In a minute you will be invited to open your box. Inside the box you will find either:

- a die, a cup and an envelope; or
- a questionnaire and a card

If you find a die and a cup in your box, you are Person A, otherwise you are Person B.

If you are Person A, you may roll the die openly on the table as many times as you wish to check that it is a fair die. For the die roll you report please roll the die only **once** and in private by placing the die in the cup, putting the lid on the cup, shaking the cup and putting the cup on the desk. Then, use the hole in the lid of the cup to see the die outcome.

To report the die outcome, open the envelope. Inside it you will find two cards; a report card with numbers from one to six printed on it like the following:

					<i>Your experimental ID</i>
Report Card					
1	2	3	4	5	6

Also, an ID card with your ID number printed on it like the following:

ID Card
<i>Your experimental ID</i>

Circle the die outcome on the report card and then place the report card back in the envelope ready for collection. Once you have completed your report, take the die out of the cup and put the die, cup and lid back in the box. Keep the ID card with you until the end of the experiment as this will be the connection to your payoff.

If you are Person B, answer all the questions on the questionnaire and, once you are finished, place the questionnaire back inside the box. Inside your box, you will also find an ID card with

your ID number printed on it. **Keep this ID card with you** until the end of the experiment as this will be the connection to your payoff.

When all participants have performed their tasks, an experimenter will collect the report cards from the Person As. Then, an experimenter will ask each Person A to pick an 'Experiment 1' report card from the bowl.

Payment procedure

Once your report cards have been collected, the payoff calculation procedure will begin. While you are waiting for the payoff calculation, we will distribute and ask you to complete a short, anonymous questionnaire. Please leave the questionnaire on your desk once you have completed it. When your payoffs are calculated, an experimenter will come to your booth to hand you a new envelope. Inside that envelope, you will find your payoff in pound sterling and a green receipt. Please sign the green receipt in private and place it in the box that the experimenter will bring to your booth. After signing and placing the green receipt in the box, the experiment is over.

Do you have any questions? If yes, raise your hand and an experimenter will come to you.

Now please open your box.

C. Belief Elicitation Questionnaire

Thank you for participating in this experiment.

Please, answer the following questions

1. Gender

Male ☐ Female ☐

2. Age group

15 – 18 ☐ 19 – 22 ☐ 23 – 26 ☐ 27 – 30 ☐ 31 – 34 ☐ > 34 ☐

3. Consider experiment 1; recall that in that experiment 30 participants were paired and asked to report a die roll that would determine the pay-off of their co-player. Also recall that if both participants reported a 5 each got £5 plus a bonus of £1, so a total of £6 and if both reported a 6 each got £6 plus a bonus of £2, so a total of £8. Take a few minutes to think about the die rolls that the people in experiment 1 might have reported. How many of those 30 do you think...

- a. reported a die roll of 1?
- b. reported a die roll of 2?
- c. reported a die roll of 3?
- d. reported a die roll of 4?
- e. reported a die roll of 5?
- f. reported a die roll of 6?

Please make sure that your answers to 3a to 3f sum up to 30.

4. Have you ever participated in an experiment, other than this one, that involved rolling a die?

Yes ☐ No ☐

D. The Complicity Game – Experimenter’s Guide

A. Preparing the experimental material

Experimental material to be used: white envelopes, brown envelopes, white cards that can fit inside the envelopes, green cards (to be used as receipts), dice, cups, lids for the cups, boxes, 1 large bowl.

Step 1 – generate subjects’ IDs-

The IDs have the following form, for all treatments:

Group 1: xyK1 and xyL1

Group 2: xyK2 and xyL2

Group 3: xyK3 and xyL3

Group 4: xyK4 and xyL4

Group 5: xyK5 and xyL5

.... Until group 15

Where **x=0** for CG, **x=1** for NAc, **x=2** for NMD.

Where **y= the session** of each treatment

Where **K = Player A** and **L = Player B**

The last number of each ID represents the group of each subject.

Step 2- prepare the cards-

a) Report cards

These are the cards that subjects will use to report their die outcome. They should be put in the white envelopes (see step3). They are all the same, coloured white and should look like this:

Report Card
1 2 3 4 5 6

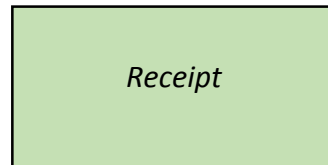
b) ID cards

These are the cards that subjects will use to collect their payoff. They should be put in the white envelopes (see step3). They are all different as each subject has an individual ID. They are white and should look like this:

ID Card
xyK1

c) Receipt cards

These are the cards that subjects must sign and return to the box by the door of the laboratory at the end of the experiment. These are standard experimental receipts but they should be printed on green paper and be put in the blue envelopes (see step 5). The die rolls of both persons should be written on them.

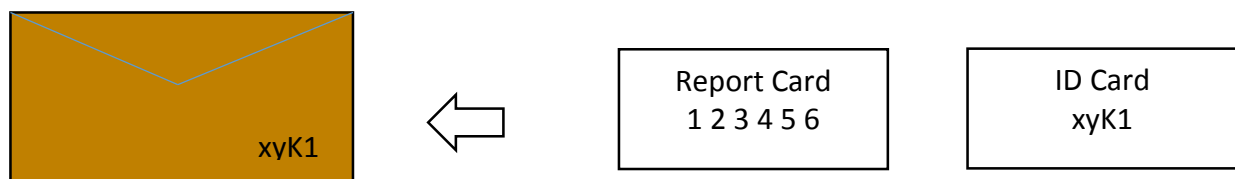


Step 3 – prepare the brown envelopes -

These envelopes are white and are to be placed in the boxes (see step 4). Write subject's ID on each envelope on the bottom right corner.

CG

Put a report card and the corresponding ID card in each envelope.

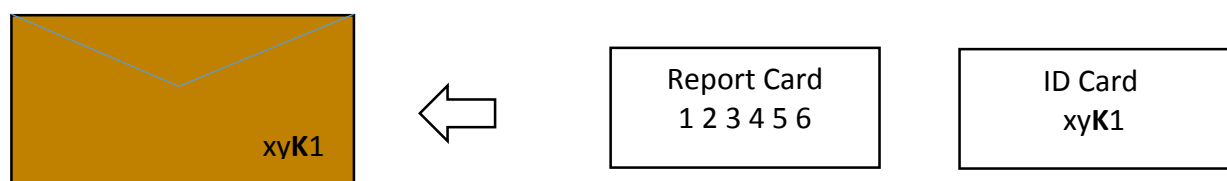


NMD

Create two clusters of envelopes, cluster K and cluster L.

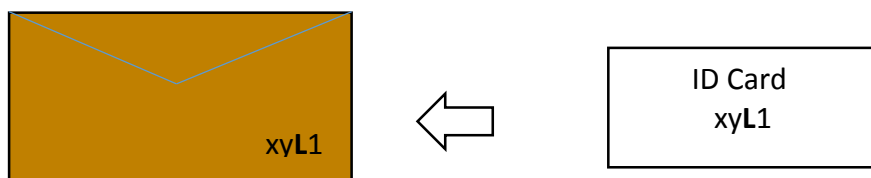
Cluster K:

All envelopes in this cluster have IDs with the letter **K** written on them. Put a report card and the corresponding ID card in each of these envelopes.



Cluster L:

All envelopes in this cluster have IDs with the letter **L** written on them. Put **ONLY** the corresponding ID card in each of these envelopes. NO REPORT CARD.



Step 4 – prepare the boxes-

On every booth there is a box. The boxes contain:

CG

15 boxes contain:

- A die.
- One of the brown envelopes containing a subject's ID with the letter **K** in it.
- A cup with the letter **A** printed on it.
- A lid for the cup with a hole on it.

15 boxes contain:

- A die
- One of the brown envelopes containing a subject's ID with the letter **L** in it.
- A cup with the letter **B** printed on it.
- A lid for the cup with a hole on it.

NAc

15 boxes contain:

- A die.
- One of the brown envelopes from **cluster K**.
- A cup.
A lid for the cup with a hole on it

15 boxes contain:

- Player Bs' questionnaires.
- A pen
- One of the brown envelopes from **cluster L**

Step 5 –prepare the white envelopes-

These envelopes are to be distributed to subjects at the end of the experiment but should be prepared before the experiment starts so as to minimize subjects' waiting time. It is important that subject's IDs are written on the bottom right corner. They are coloured blue.

All Treatments

All 30 envelopes should contain:

- £2 show up fee
- Subject's green receipt



B. Procedures

Invite subjects to participate in the experiment using the standard procedures. Before letting subjects into the lab, place a box and a set of experimental instructions in each booth. Boxes can be randomly allocated to booths.

CG

Before the experiment starts

- Let the subjects wait outside the lab.
- Invite them into the lab one by one.
- Ask each subject entering the lab to pick a number from 1-30 out of a bag. The number indicates their laboratory seat.
- Once everyone has taken their seat say out loud 'PLEASE DON'T OPEN THE BOXES ON YOUR DESK UNTIL YOU ARE INSTRUCTED TO DO SO'

During the experiment

- Start reading the instructions: 'In this experiment you will be asked to perform a task ... The experimenter will come by your booth to check your answers.'
- Let the subjects answer the questions and proceed to check their answers when they raise their hand.
- Have an 'answers guide' to check the answers quickly and take some extra question sheets with you before visiting subjects' booths.
 - *If the questions are correctly answered, put a green tick on their questions' sheet.
 - *If there are some mistakes, replace the question sheet with a new one and ask the subjects to try again and raise their hand when they are done.

- Make sure all the subjects have answered correctly by checking that they all have a green tick on their questions' sheet.
- Continue reading the instructions: 'In a minute, you will be invited to open your box... Now please open your box.'

Collecting the envelopes

- Leave approximately 6 minutes for the subjects to roll their dice and report the outcome.
- Proceed to the booths to collect the envelopes.
- While collecting the envelopes, make sure that each subject has kept her/his ID card.
- (Optional: distribute questionnaires)
- Once you have collected all envelopes return to the experimenter's booth.
- Put together all envelopes that have the letter K on the IDs (group K) and then put together all envelopes that have the letter L on the IDs (group L).
- Put these two groups of envelopes in a box and hand them to the experimenter outside the laboratory.
- While walking to hand in the envelopes say out loud: ' I am now handing in your envelopes to the person outside this laboratory who is going to calculate your payoffs'

Calculating payoffs (for the person outside the lab and her assistant)

- Person 1 keeps the white envelopes of group K and the Person 2 keeps the white envelopes of group L.
- Both persons order their white envelopes from 1 to 15
- Person 1 who deals with **group K** has the blue envelopes containing the **letter L** on the IDs, next to her also ordered from 1 to 15. (the following are the same for Person 2 who deals with group L and has the blue envelopes with the letter K and follows person 1's orders)
- Take out the green receipt from the white envelope ending in 1
- Open the brown envelope ending in 1
- See the number reported
- Person 1 says the number reported out loud
- Person 2 says the number reported out loud
- If the numbers are not the same, put the number you heard in the second section (your report) of the receipt.
- Put the number of your report card on the first section of the receipt.
- Put as many pounds as the number on your report card inside the envelope and seal it.
- If numbers are the same (5 or 6) put the £6 or £8 pounds in the envelope and fill in the receipt and report appropriately.
- Once all 30 white envelopes are sealed, Person 1 takes them to the experimenter inside the lab.

Payment procedure (for the person inside the lab)

- Once you receive the blue envelopes you say out loud 'Your payoffs have been calculated and are ready for collection. Please, stand up and form a queue starting from my right. Make sure you have your ID card handy'.
- Ask the first subject to proceed to the desk.
- Ask for his ID card
- Search for the envelope that has the same ID and give it to the subject
- Remind the subject that she/he has to sign the green receipt card and place it in the box by the door.
- Repeat the same for all subjects.