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University of East Anglia

2019-04

SENDER-RECEIVER GAMES WITH ENDOGENOUS EX-POST INFORMATION ACQUISITION: EXPERIMENTAL EVIDENCE

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Sender-Receiver Games with Endogenous Ex-Post Information Acquisition: Experimental Evidence*

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November 20, 2019

Abstract

We study the effects of endogenous ex-post information acquisition on lying behavior and beliefs in a Sender-Receiver game. After choosing an action, the Receiver can decide to find out if the Sender lied or not. We observe that a significant proportion of Receivers decide to become informed, even when this information is costly. There is, however, no impact of the option of information acquisition on Sender behavior, and no evidence of Senders being shame averse.

Keywords: Sender-Receiver Games; Endogenous Ex-Post Information Acquisition; Shame Aversion.

JEL classification: C91;D63;D82.

*We wish to thank seminar participants at the 2018 CCC Meeting at UEA, and at the Behavioral Game Theory Workshop for helpful comments.

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1 Introduction

Following the seminal work by Crawford and Sobel (1982), Sender-Receiver games have been used extensively for studying deceptive behavior. In a Sender-Receiver game, the Sender holds private information about the state of the world and sends a costless message to the Receiver. After observing the message, the Receiver chooses an action that generates payoffs to each player, and the game ends.

A common feature of all the economic experiments using Sender-Receiver games that we are aware of is that the Receiver has no option to learn ex post, that is after she has chosen an option, whether the Sender lied or not (see Gneezy, 2005; Hurkens and Kartik, 2009; Sanchez-Pages and Vorsatz, 2009; Sutter, 2009). This study experimentally investigates what are the effects on Sender and Receiver behavior if the Receiver *ex-post* (i.e., after he or she has chosen an action) has the *option*, possibly at a *cost*, to be informed about the state, after which the Receiver, informed or not, can then write a free message to the Sender.

A purely self-interested Receiver would never pay for ex-post information, since in a one-shot game doing so cannot affect her payoff. There may however be other reasons why people would be willing to pay for ex-post information. The receiver may wish to use the option of writing a message to non-monetarily punish (reward) the Sender for lying (telling the truth) (see Ellingsen and Johannesson, 2008; Xiao and Houser, 2005, 2009). The Receiver may also be curios about whether the Sender lied or not, and may want to find out if the Receiver made the right decision (see Golman et al., 2017; Loewenstein, 1994; Golman and Loewenstein, 2015). Moreover, if some Receivers do

obtain costly information, do Senders anticipate it, and does it make make them less likely to lie, perhaps due to a desire to avoid feeling shame from being caught lying? (see for example Tadelis, 2011; Dufwenberg and Dufwenberg, 2018; Greenberg et al., 2015; Van de Ven and Villeval, 2015)

We believe situations where i) an uninformed party (Receiver) has an opportunity ex post, possibly at a cost, to learn the truthfulness of the information she received from an informed party (Sender), and ii) the Receiver can get back to the Sender (via e.g. email or face to face), are common place. For example, after having bought an item or signed up to a service, people can spend time consulting family and friends, or go online, to find out if they were given correct information, and can get back to the Sender via email.

We find that a significant proportion of Receivers (about 25 %) decide to become informed when it is costly to get this information. When it is free almost all Receivers become informed. The content of the messages that the Receiver writes back to the Sender naturally depends on whether the Receiver decided to become informed or not, and whether this information revealed to the Receiver that she was lied to or told the truth. In the former case, the Receiver often expresses his frustration and anger with the Sender, while in the latter, the Receiver often thanks the Sender for being honest.[1]

Senders lie about the same in all treatments, and their lying decision is not very sensitive to whether they believe the Receiver will be informed or not. This is also true in our two control treatments where it is commonly known that Receivers exogenously get information or not. We interpret this as evidence that Senders are not influenced much by shame aversion - they do not seem to care much about whether the Receiver finds out that they lied or told the truth.

[1] All messages can be found in Appendix C

As already mentioned, there may be several reasons why some Receivers pay for ex-post information, such as a desire to verbally punish/reward a lying/truthful Sender, or because they are curious about whether he or she was told the truth and if the best option was chosen. Our experiment does not allow us to disentangle these motives. A future experiment could allow the Receiver to pay for ex-post information, as in the existing set-up, but rule out the possibility of writing a message back to the Sender.

The rest of the paper is organized as follows. Section 2 reviews the existing related literature. Section 3 describes our experimental design. In Section 4, we derive our main hypotheses. We summarize our results in Section 5, and Section 6 concludes. All instructions and Receivers' messages can be found in the Appendix.

2 Related literature

There are several theoretical and experimental studies on the effects of ex-ante disclosure in Sender-Receiver games (see for example Cain et al., 2005, 2010; Loewenstein et al., 2014; Li and Madarász, 2008; Van de Ven and Villeval, 2015), but we are only aware of two papers on (exogenous) ex-post information in Sender-Receiver games, Behnk et al. (2014) and Greenberg et al. (2015)

Behnk et al. (2014) experimentally study a Sender-Receiver game where the Sender knows both players' payoffs, but the Receiver knows neither. The Sender then sends a message, and the Receiver chooses an action. In the baseline treatment the Receiver only learns his own payoff after having chosen an action. In the second (third) treatment, the Receiver learns with probability one (one-half) both players' payoffs after having chosen the action. Behnk et al.

(2014) observe that the Sender sometimes lies less when the Receiver learns the payoffs with probability one-half than with probability one. While in Behnk et al. (2014) the Receiver exogenously gets ex-post information about the payoffs, we allow for *endogenous* ex-post information acquisition by the Receiver, and this can be costly.

Greenberg et al. (2015) observe that the Sender lies less when it is common knowledge that the Receiver will exogenously learn the truth than when he or she will never know. This is evidence of the role played by shame. As Behnk et al. (2014), Greenberg et al. (2015) only consider the case of exogenous ex-post information, while we allow for endogenous information acquisition.

3 Experimental Design and Procedures

3.1 Experimental Design

We use a cheap talk Sender-Receiver game similar to the one used in Gneezy (2005). There are two players, the Sender and the Receiver, and two options, A and B. Option A gives £10 to the Sender and the same to the Receiver. Option B gives £14 to the Sender, and £6 to the Receiver. The Sender knows how much money each of the players gets from each option, but the Receiver knows nothing. All this information is common knowledge. The game is played as follows:

The Sender first sends one of two possible messages to the Receiver:

> Message 1: 'Option A will earn you more money than option B.'
> Message 2: 'Option B will earn you more money than option A.'

Thus Message 1 (2) is the true (false) message. After reading the message,

the Receiver chooses an option and each player receives their corresponding payoffs.

We conducted four treatments. In our first treatment, No Information (*No-Info*), after the Receiver chooses an option she learns how much she earned from the chosen option, but she never learns what the Sender earned from the chosen option, and never learns how much each would have gotten had the Receiver chosen the other option. Thus the Receiver never finds out if the Sender lied or not.

In our second treatment, Exogenous Information (*Exo-Info*), after the Receiver chooses an option, she automatically knows how much she and the Sender earned from the chosen option, and how much each would have gotten had the Receiver chosen the other option.

In our third and fourth treatment, Endogenous Free Information (*Endo-Free-Info*) and Endogenous Costly Information (*Endo-Costly-Info*), after the Receiver chooses an option, she can now decide to learn how much the Sender earned from the chosen option, and how much each would have gotten had the Receiver chosen the other option. The only difference between these treatments is that in Endo-Free-Info this information is free, while in Endo-Costly-Info this costs £1, which is subtracted from the overall earnings.

In all treatments, except No-Info, the Receiver could, after she had chosen an action and after any information decision had been made, at no cost, write a message to the Sender. The Receiver was free to write whatever she prefers, except to use threatening language or reveal the Receiver's identity.[2]

[2]We did not include the option to write a message to the Receiver in No-Info, since in this treatment the Receiver only learns her own payoff, so there seemed to be little to write about.

3.2 Procedure

The experiment was conducted at the Laboratory for Economic and Decision Research (LEDR) at the University of East Anglia. Subjects were undergraduate students, recruited through the on-line system ORSEE (Greiner (2015)).

We had a total of 324 subjects (162 senders and 162 receivers) in 18 sessions: 4 sessions in No-Info, 4 sessions in Exo-Info, 6 sessions in Endo-Costly-Info, and 4 sessions in Endo-Free-Info. The average age was 20.7 years; the minimum age was 18, the maximum 47. 52 % of the subjects were females. Each subject participated in only one session. The experiment was programmed and conducted with the software z-Tree (Fischbacher (2007)).

Upon arrival, subjects were randomly assigned to separate computer terminals. The experimenter read aloud the instructions, and these were also shown on the participants' computer screens. The instructions can be found in Appendix A. The computer randomly matched the subjects in pairs and assigned the role of either a Sender (Player 1) or a Receiver (Player 2) to each pair member. Subjects in the role of Player 1 and Player 2 received role-specific instructions on their computer screens.[3]

We asked in all treatments the Sender to indicate which option (A or B) he expected the Receiver he was matched with to choose, and how many Receivers (out of 100) would follow the Sender's message. In the Endo-Free-Info and Endo-Costly-Info treatments we also asked the Sender whether or not he expected the Receiver he was matched with to get information about the payoffs or not (yes or no), and how many Receivers out of 100 he or she expected would get information. These questions were asked after the Sender had cho-

[3]Screenshots for the Endo-Costly-Info treatment can be found in Appendix B. All other screenshots are available from the authors upon request.

sen a message.

We also asked in all treatments the Receiver whether she thought the message she received was true or false. This question was asked after the Receiver had chosen the action. None of these belief questions were monetarily incentivized.

Once all subjects made their decisions they were asked to complete an on-screen questionnaire, which gathered data on gender, field of study, and country of origin. Subjects also provided feedback on the experiment. An experimental session lasted less than 45 minutes. The average earnings across sessions were £11.23 for Senders (S.D. 1.85) and £8.71 for Receivers (S.D. 1.87). Subjects were paid individually and privately in cash at the end of the session.

4 Hypotheses

Suppose first it is common knowledge that both the Sender and the Receiver are rational and self-interested. Then it is common knowledge that the Sender does not care about whether the Receiver finds out that the Sender lied or not.

Hypothesis 1. *(self-interest) The proportion of Senders who lie is the same in all treatments, and the Receivers' response to any message is the same in all treatments. No Receivers get information when it is costly, while this is indeterminate when information is free.*

The indeterminacy in the Receiver's decision to be informed when information is free does not seem very robust; it would take only an 'epsilon' amount of curiosity to make the Receiver get the information.

Suppose now it is common knowledge that the Sender dislikes the Receiver finding out that the Sender lied. We call this shame aversion (see for example

Tadelis, 2011; Van de Ven and Villeval, 2015; Greenberg et al., 2015; Dufwenberg and Dufwenberg, 2018; Gneezy et al., 2018).[4] In the endogenous information treatments, a shame averse Sender's behavior depends on his or her beliefs about whether the Receiver will be informed or not.

Hypothesis 2. *(shame aversion) Fewer Senders lie in Exo-Info than in No-Info, and so Receivers are more likely to follow the Sender's message in the former than the latter treatment. In Endo-Free-Info and Endo-Costly-Info, Senders are less likely to lie the more likely they think it is that the Receiver gets information.*

5 Results

Table 1 presents summary statistics. The first row reports the proportion of Senders who lied (i.e., sent message 2). Senders lied slightly less in Exo-Info than in No-Info treatment (23 % and 26%, respectively), but the difference is not significant (χ^2 (1) = 0.07, p = 0.792). Hence there is no support for shame aversion (Hypothesis 2). The proportion of Senders who lie in Endo-Costly-Info is 33%, and 24% lie in Endo-Free-Info. This difference is insignificant (χ^2 (1) = 0.78, p = 0.377).

Finding 1. *The proportion of Senders who lie is the same across all four treatments.*

We say the Receiver 'follows the Sender's message' if the Receiver chooses the option that the Sender's message says is the best. The second row of Table 1 reports the proportion of Receivers who followed the Sender's message. 86 % of Receivers follow the Sender's messages in No-Info, 87% in Exo-Info, 87% in

[4]Note that guilt aversion (see for example Battigalli and Dufwenberg, 2007; Battigalli et al., 2013; Ellingsen et al., 2010) also predicts there should be no difference between any of the four treatments.

Endo-Costly-Info, and 80% in Endo-Free-Info. Considering all four treatments, the difference between the proportion of Receivers that follow the Sender's message is not significant (χ^2 (3) = 1.31, p = 0.728). Hence, we do not find support for Hypothesis 2 that Receivers are more likely to follow the Sender's message in Exo Info than No-Info.

Finding 2. *The Receiver's response to any message is the same across all four treatments.*

The third row of Table 1 shows the proportion of Receivers who decided to get information. The proportion of Receivers who get information is significantly higher in Endo-Free-Info (93%) than in Endo-Costly-Info (23%) (χ^2 (1) = 39.96, p = 0.000). We find statistical evidence that the proportion of subjects choosing information in Endo-Costly-Info treatment is significantly different from zero (p<0.05).[5] This evidence is inconsistent with Hypothesis 1.

Finding 3. *A significant proportion of Receivers obtain costly ex-post information.*

Table 1: Choices

	Treatment			
	No Info	Exo Info	Endo-Costly-Info	Endo-Free-Info
Number of sender-receiver pairs	43	39	39	41
(1) Senders who lie	0.26	0.23	0.33	0.24
(2) Receivers who follow Sender's message	0.88	0.87	0.87	0.80
(3) Receivers who get information	-	-	0.23	0.93

All numbers are proportions.

[5] Using Newcombe's method (see Newcombe, 1998), we calculate a 95% confidence interval for Receivers choosing costly information. We are 95% confident that the interval 13.7% to 32.4% contains the proportion of the Receivers choosing costly information.

5.1 Beliefs

In the first row of Table 2 we report the proportion of Receivers who believed the Sender will lie. In the No-Info treatment, 28% of Receivers believed the Sender will lie. This percentage decreased to 10% in Exo-Info. A χ^2-test showed a significant difference between No-Info and Exo-Info (χ^2 (1) = 4.05, p = 0.04). This provides some evidence that Receivers believe Senders are shame averse, i.e., they will lie less when they know the Receivers will always find out if they were told the truth or not. In the endogenous information treatments, the proportions were similar, 27% in Endo-Free-Info and 21% in Endo-Costly-Info.[6]

In the second row of Table 2, we report the proportion of Senders who expected the Receiver to follow the message. A large majority of Senders expected the Receiver to follow the message, and these expectations did not change much across treatments.[7] These findings are consistent with those in Gneezy (2005), who also found a vast majority of Receivers follow the Receiver's message.

The third row of Table 2 reports the proportion of Senders who believed the Receiver will get information about the payoffs. 98% of Senders expected the Receiver to get information in Endo-Free-Info and 46% of Senders expected the same in Endo-Costly-Info. These proportions were significantly different across treatments (χ^2 (1) = 26.49, p = 0.00), and qualitatively match the Receivers' actual information decisions.

[6]Considering these two treatments, the proportion of Receivers who expected the Sender to lie do not significantly differ across treatments (χ^2 (1) = 0.44, p = 0.51).

[7]We find significant differences across Endo-Costly-Info and Endo-Free-Info treatments (χ^2 (1) = 6.64, p = 0.01). However, we don't find significant differences across No-Info and Exo-Info treatments (χ^2 (1) = 0.35, p = 0.55).

Table 2: Beliefs

	Treatment			
	No-Info	Exo-Info	Endo-Costly-Info	Endo-Free-Info
Number of sender-receiver pairs	43	39	39	41
(I) Receivers who believe the Sender will lie	0.28	0.10	0.21	0.27
(II) Senders who believe the Receiver will follow the message	0.77	0.82	0.67	0.90
(III) Senders who believe the Receiver will get information	-	-	0.46	0.98

Note: All numbers are proportions.

5.2 Senders' Belief About the Receiver's Information Decision

We next consider if in the endogenous information conditions Senders are less likely to lie, the more they believe that the Receiver will be informed. We find that, in the aggregate, the proportion of Senders who lied was higher when the Sender believed the Receiver will get information about the payoffs compared to when the Sender believed the Receiver will not get information. 58 Senders believed the Receiver would get information, and 20 % (11/55) of them lied. Similarly, 22 Senders believed the Receiver would not get information, and 40.9 % (9/22) of them lied. The difference between these two proportions was, however, not significant (χ^2 (1) = 2.19, p = 0.139).

We can also consider Endo-Costly-Info and Endo-Free-Info separately. In Endo-Costly-Info, 18 Senders believed the Receiver would get information, and 22.2 % (4/18) of them lied. Similarly, 21 Senders did not believe the Receiver would get information, and 42.9 % (9/21) lied. The difference was not significant (χ^2 (1) = 1.86, p = 0.173). In Endo-Free-Info, 40 Senders believed the Receiver to be informed, and 25% (10/40) of them lied. Only one Sender

believed the Receiver would not be get information, and he/she did not lie.

Finding 4. *In both Endo-Free-Info and Endo-Costly-Info, Senders who believe the Receiver will get information about the payoffs are as likely to lie as the Senders who believe the Receiver will not be informed.*

These findings go against Hypothesis 2 and indicate that shame aversion is not an important motivation among Senders.

5.3 Receivers' Messages

The Receiver could in all treatments, except No Info, write a message to the Sender at the end of the game. In total 87.2% of Receivers (34 out of 39) sent a message in Exo-Info, 92.3% of Receivers (36 out of 39) did so in Endo-Costly-Info, and 80.5% (33 out of 41) wrote back in Endo-Free-Info. Appendix C contains a full list of messages broken down by treatment, the Sender's message, the Receiver' action choice and (in Endo-Costly-Info and Endo-Free-Info) the Receiver's information decision.

A natural hypothesis is that the content of these messages depends on whether an informed Receiver finds out she was lied to or told the truth. This is straightforwardly confirmed by reading the messages; see again the Appendix.[8] In Exo-Info, Receivers who found out they were told the truth tended to write thankful messages ("Thank you for telling the truth"; "Cheers geeze"; "Thank you! appreciate the honesty"), and/or they praised the Sender for his honesty. Receivers who found out they were lied to tended to express anger (for example: "not cool man that is legit so annoying feel like such an idiot now") and sarcasm (for example: "sharing is caring what would Jesus do?")

[8] In what follows, we pool all messages across the two endogenous information treatments.

Similarly, in the endogenous information treatments, when the Receiver realises she was lied to there is a pronounced presence of negative (or sarcastic) messages in the first group ("you liar:P", "enjoy the money", and "lol, liar liar pants on fire"). On the other hand, when the message was truthful, the receiver thanks the Sender ("You Hero, thank you for being a decent person", and "thank you for recommending the fairer option :)").

6 Conclusions

We experimentally study a Sender-Receiver game (Crawford and Sobel, 1982) where the Receiver can ex post (after he or she has chosen the action) decide to be informed about the true state, and can then send a message back to the Sender. It is either free or costly to get get this information. When information is costly, no self-interested Receiver should obtain it.

We observe that almost all Receivers get information when it is free; when it is costly, about 25 % become informed. We believe this is a new finding. The price of getting ex-post information is quite high in our experiment (at least 10 % of the Receiver's earnings); we conjecture that more information would be obtained if the price was lower. We interpret the Receivers who get costly information as being willing to give up money in order to verbally punish a lying Sender, and/or being curious about whether they were lied to or told the truth, and whether they made the right decision or not. A future experiment can disentangle these motives.

We also observe that Senders' decision to lie is insensitive to their beliefs about whether the Receiver will get information or not. This remains true even when, as in two control treatments with exogenous information, Senders know

that the Receiver will either be informed or not. Thus there is no evidence in our data that Senders dislike the Receiver finding out that they were lied to (shame aversion).

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Appendices

Appendix A Experimental Instructions

Thank you for participating in this experiment. In this experiment, you can earn money. What you earn will depend upon your decision and on the decision of another participant in the room. No data that you provide can be associated with your person. All data will be treated confidentially.

Please follow the instructions carefully. These instructions explain how the experiment works. If any of the instruction are unclear, or if you have any questions, please raise your hand and I will come and assist you. Please do not talk to any other participant during the experiment.

In this experiment, you will be randomly matched with another participant in this room. I call him or her your co-participant. One of you will be assigned to the role of Player 1 and the other will be assigned to the role of Player 2. You will hold this role throughout the experiment.

Player 1 will not learn the identity of Player 2, and similarly Player 2 will not learn the identity of Player 1. Your earnings will be paid to you in cash at the end of the experiment.

A.1 Instructions for No-Info treatment

Options: There are two options, A and B. Each option specifies an amount of money to Player 1 and to Player 2. Player 1 will be informed about how much each option pays out to each player, but Player 2 will not get any information about these amounts.

Decisions: There are two messages. Both players will know what the messages are. Player 1 first chooses one of the messages and sends it to Player 2. After reading the message, Player 2 then chooses Option A or Option B, and each player receives the payment from the chosen option.

Player 2 will be informed how much he or she will be paid from the chosen option, but Player 2 will never learn how much Player 1 got, and Player 2 will also never learn how much the option that he or she did not choose gave to Player 1 and 2.

After Player 2 has made his or her decision, no more decisions will be made.

A.2 Instructions for Exo-Info treatment

Options: There are two options, A and B. Each option specifies an amount of money to Player 1 and to Player 2. Player 1 will be informed about how much each option pays out to each player, but Player 2 will initially not get any information about these amounts.

Decisions: There are two messages. Both players will know what the messages

are. Player 1 first chooses one of the messages and sends it to Player 2. After reading the message, Player 2 then chooses Option A or Option B, and each player receives the payment from the chosen option.

Player 2 will then be informed how much he or she will be paid from the chosen option, and how much Player 1 got. Player 2 will also learn how much the option that he or she did not choose gave to Player 1 and 2.

Player 2 can write one or several messages and send it to Player 1. Player 2 is free to write whatever he or she prefers (he or she can choose not to write anything) but we ask Player 2 not to use threatening language or reveals his or her identity. After Player 2 has sent his or her message to Player 1, no more decisions will be made.

A.3 Instructions for Endo-Costly-Info treatment

This experiment has two stages.

First stage:

Options: There are two options, A and B. Each option specifies an amount of money to Player 1 and to Player 2. Player 1 will be informed about how much each option pays out to each player, but Player 2 will initially not get any information about these amounts.

Decisions: There are two messages. Both players will know what the messages

are. Player 1 first chooses one of the messages and sends it to Player 2. After reading the message, Player 2 then chooses Option A or Option B, and each player receives the payment from the chosen option.

Player 2 will then be informed how much he or she will be paid from the chosen option, but Player 2 will not learn how much Player 1 got, and Player 2 will also not learn how much the option that he or she did not choose gave to Player 1 and 2.

Second stage:

Options: Player 2 can find out how much money the chosen option gives to Player 1, and how much the option that Player 2 did not choose would have given to each player. If Player 2 decides to get this information, £1 will be subtracted from Player 2's overall earnings.

Regardless of whether or not Player 2 decides to get information, Player 2 can write one or several messages and send it to Player 1. Player 2 is free to write whatever he or she prefers (he or she can choose not to write anything) but we ask Player 2 not to use threatening language or reveals his or her identity. After Player 2 has sent his or her message to Player 1, no more decisions will be made.

A.4 Instructions for Endo-Free-Info treatment

This experiment has two stages.

First stage:

Options: There are two options, A and B. Each option specifies an amount of money to Player 1 and to Player 2. Player 1 will be informed about how much each option pays out to each player, but Player 2 will initially not get any information about these amounts.

Decisions: There are two messages. Both players will know what the messages are. Player 1 first chooses one of the messages and sends it to Player 2. After reading the message, Player 2 then chooses Option A or Option B, and each player receives the payment from the chosen option.

Player 2 will then be informed how much he or she will be paid from the chosen option, but Player 2 will not learn how much Player 1 got, and Player 2 will also not learn how much the option that he or she did not choose gave to Player 1 and 2.

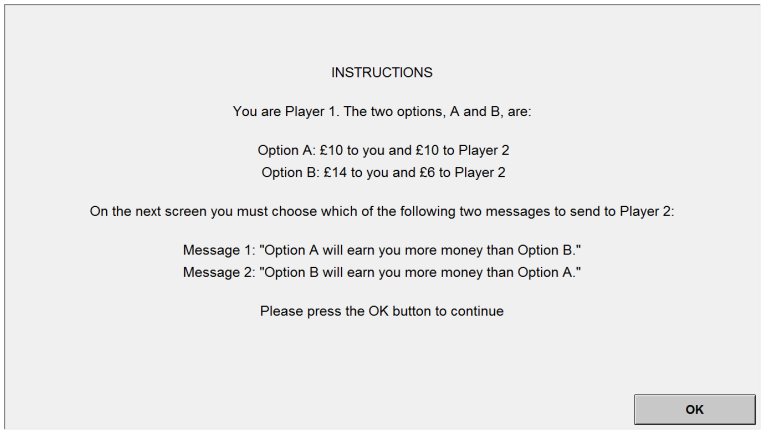
Second stage:

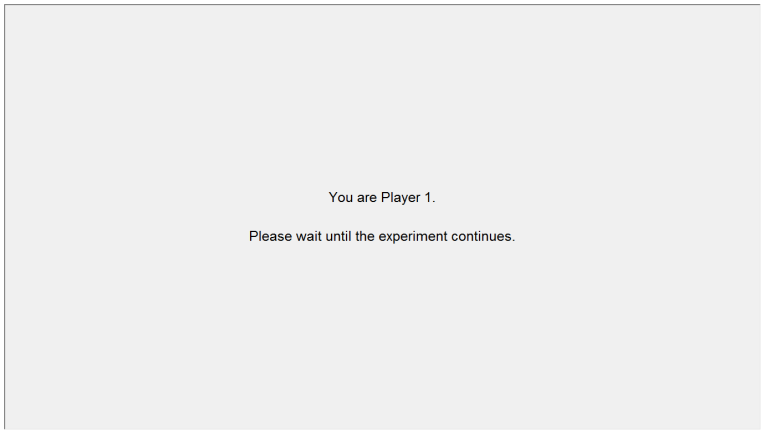
Options: Player 2 can find out how much money the chosen option gives to Player 1, and how much the option that Player 2 did not choose would have given to each player. It is free for Player 2 to get this information.

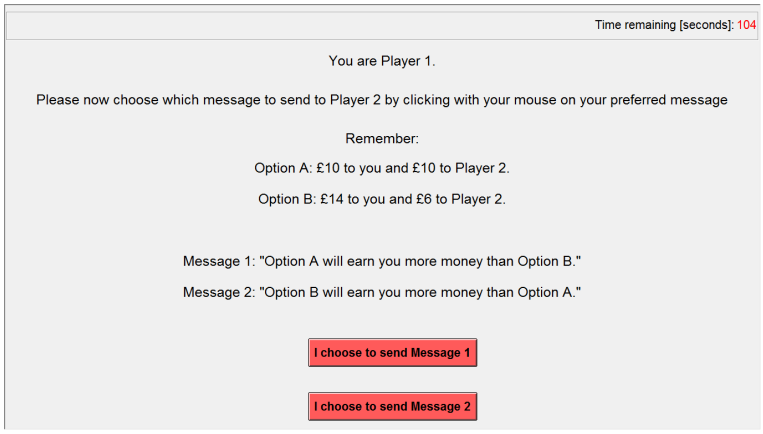
Regardless of whether or not Player 2 decides to get information, Player 2 can write one or several messages and send it to Player 1. Player 2 is free to write whatever he or she prefers (he or she can choose not to write anything) but we ask Player 2 not to use threatening language or reveals his or her identity. After Player 2 has sent his or her message to Player 1, no more decisions will be made.

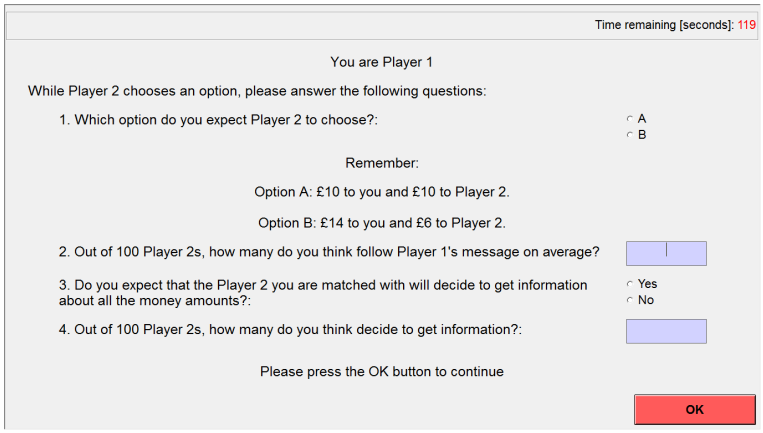
Appendix B Screenshots for Endo-Costly-Info Treatment

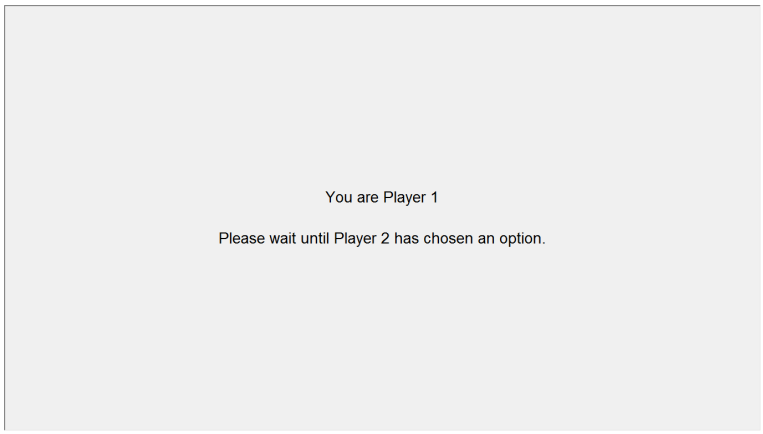
Screenshots for the Sender

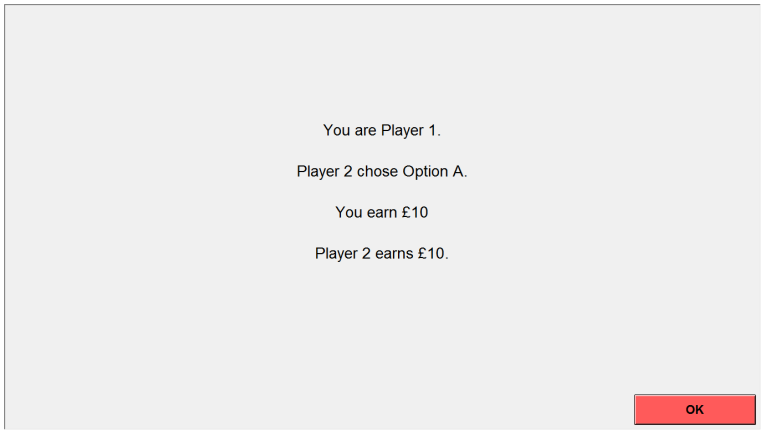


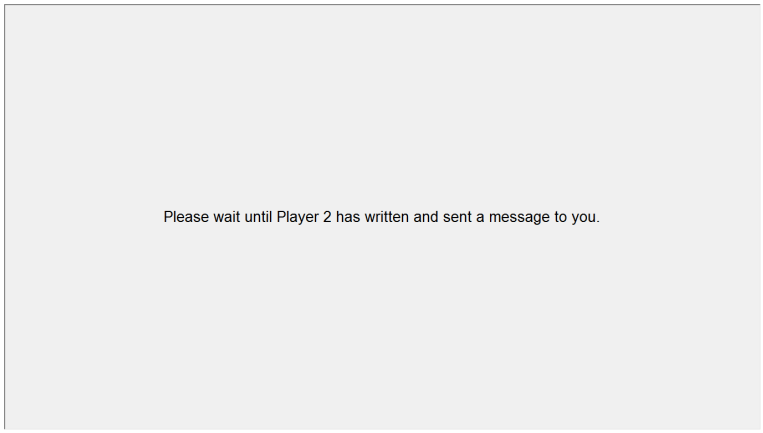


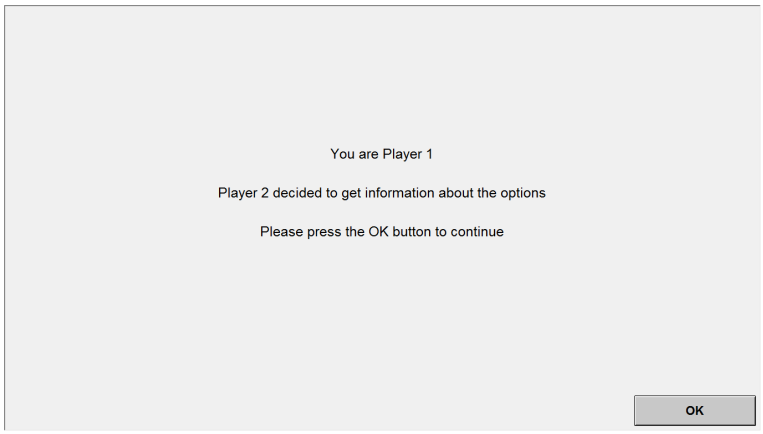

Time remaining [seconds]: 104
You are Player 1.
Please now choose which message to send to Player 2 by clicking with your mouse on your preferred message
Remember:
Option A: £10 to you and £10 to Player 2.
Option B: £14 to you and £6 to Player 2.
Message 1: "Option A will earn you more money than Option B."
Message 2: "Option B will earn you more money than Option A."
I choose to send Message 1
I choose to send Message 2

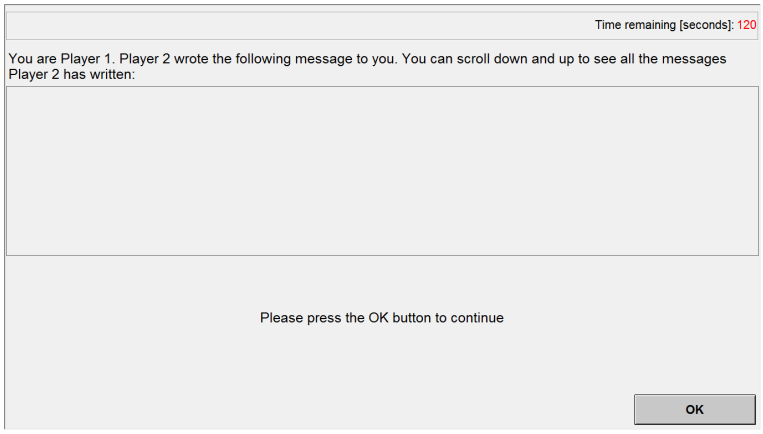

Time remaining [seconds]: 119
You are Player 1
While Player 2 chooses an option, please answer the following questions:
1. Which option do you expect Player 2 to choose?:
A
B
Remember:
Option A: £10 to you and £10 to Player 2.
Option B: £14 to you and £6 to Player 2.
2. Out of 100 Player 2s, how many do you think follow Player 1's message on average?
3. Do you expect that the Player 2 you are matched with will decide to get information about all the money amounts?:
Yes
No
4. Out of 100 Player 2s, how many do you think decide to get information?:
Please press the OK button to continue
OK

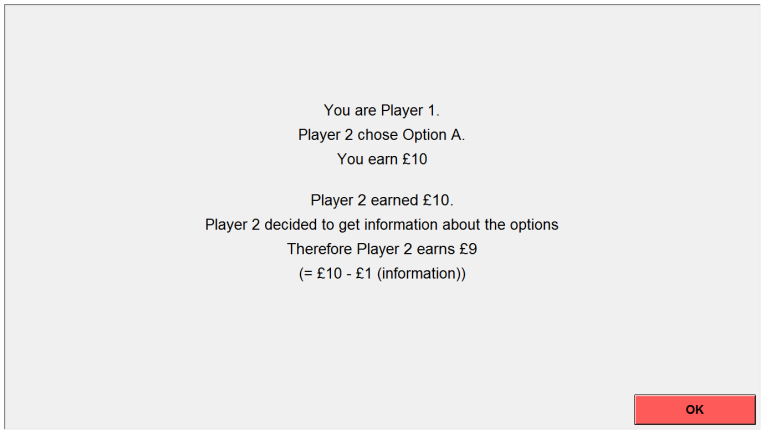

You are Player 1
Please wait until Player 2 has chosen an option.

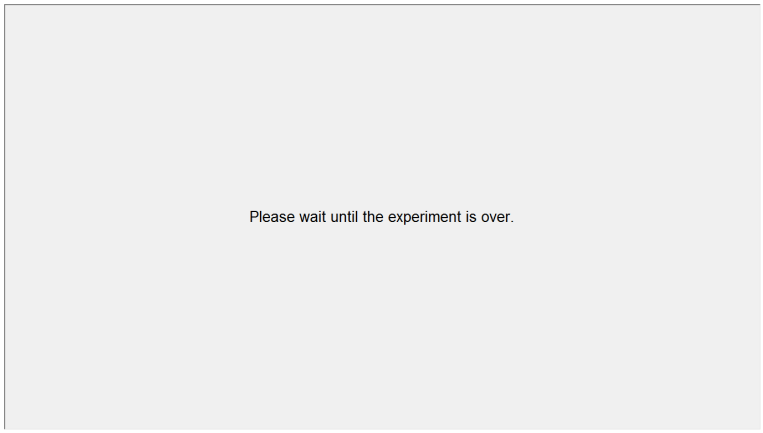

You are Player 1.
Player 2 chose Option A.
You earn £10
Player 2 earns £10.
OK


Please wait until Player 2 has written and sent a message to you.

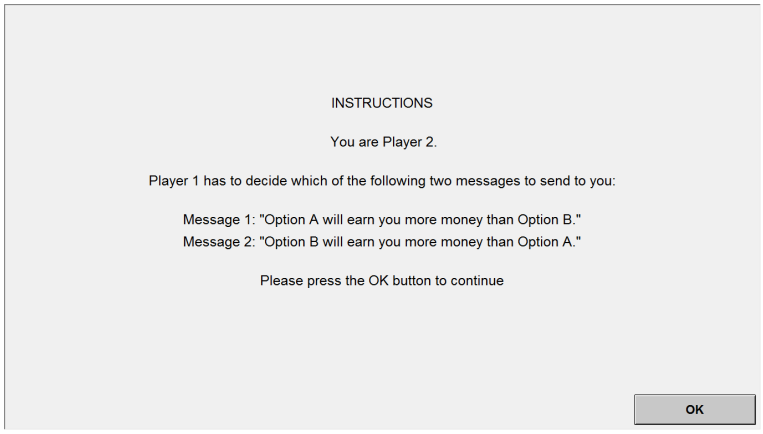

You are Player 1
Player 2 decided to get information about the options
Please press the OK button to continue
OK

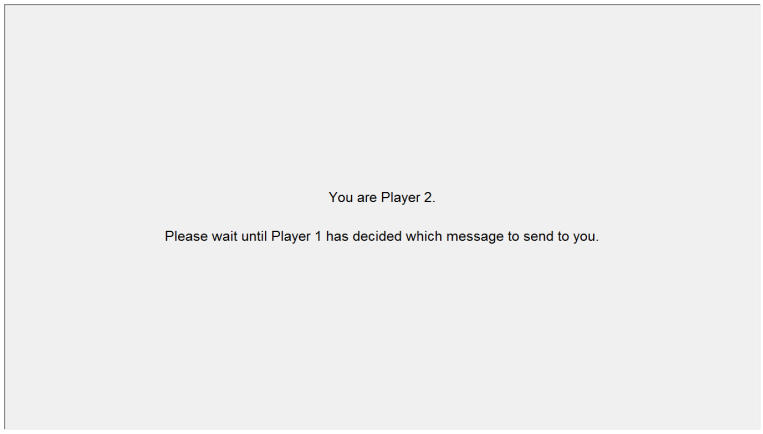

Time remaining [seconds]: 120
You are Player 1. Player 2 wrote the following message to you. You can scroll down and up to see all the messages Player 2 has written:
Please press the OK button to continue
OK

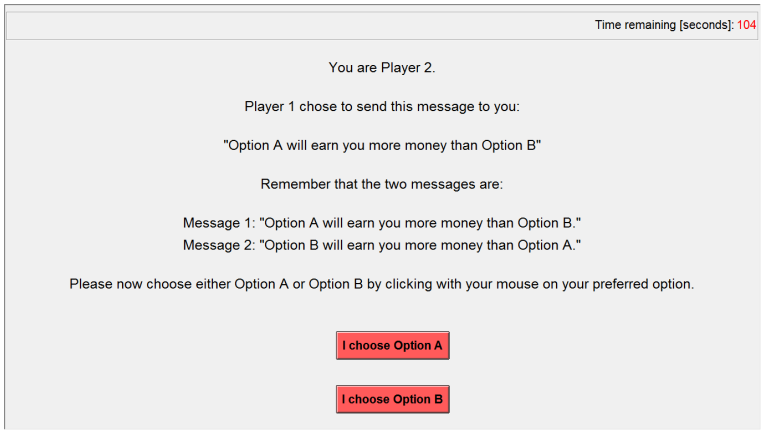

You are Player 1.
Player 2 chose Option A.
You earn £10
Player 2 earned £10.
Player 2 decided to get information about the options
Therefore Player 2 earns £9
(= £10 - £1 (information))
OK

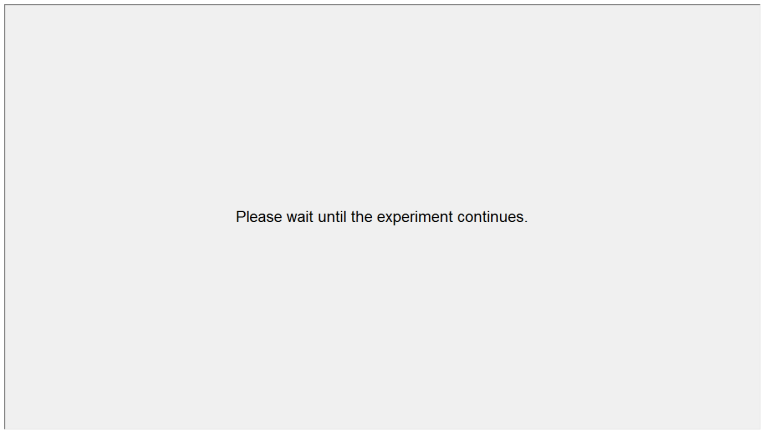

Please wait until the experiment is over.

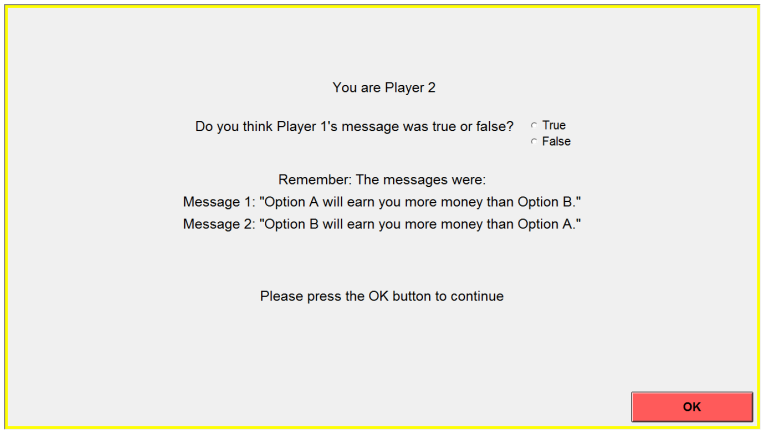
Screenshots for the Receiver

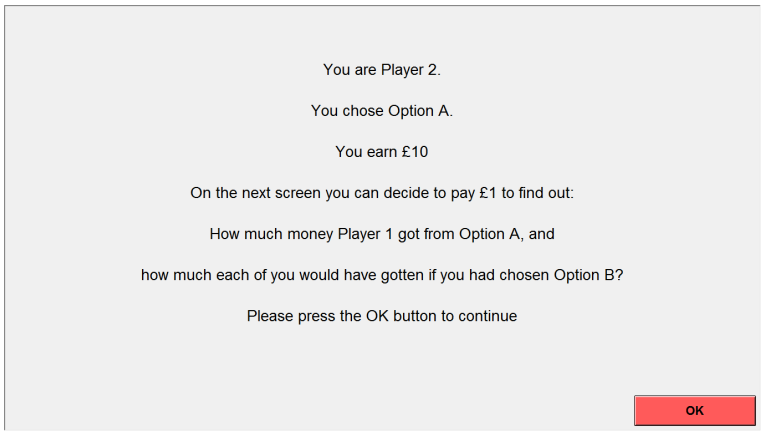


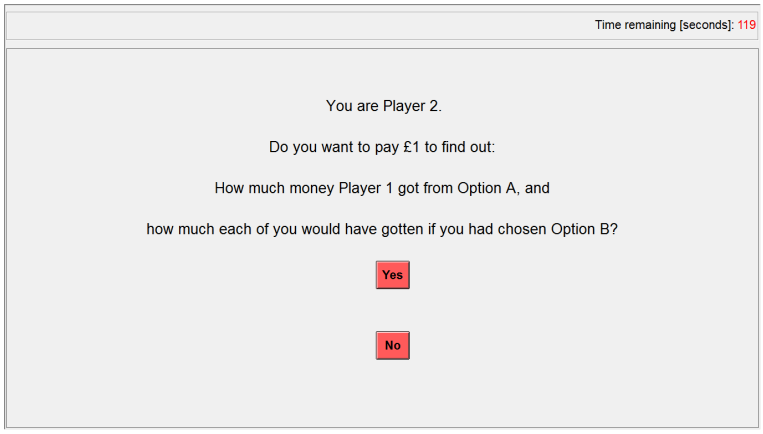


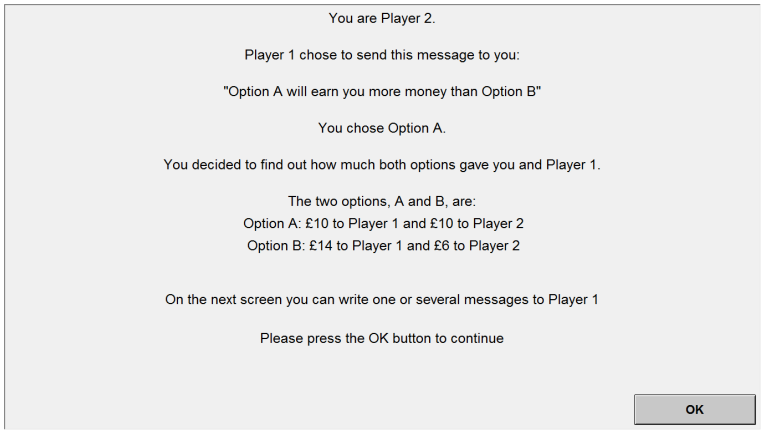


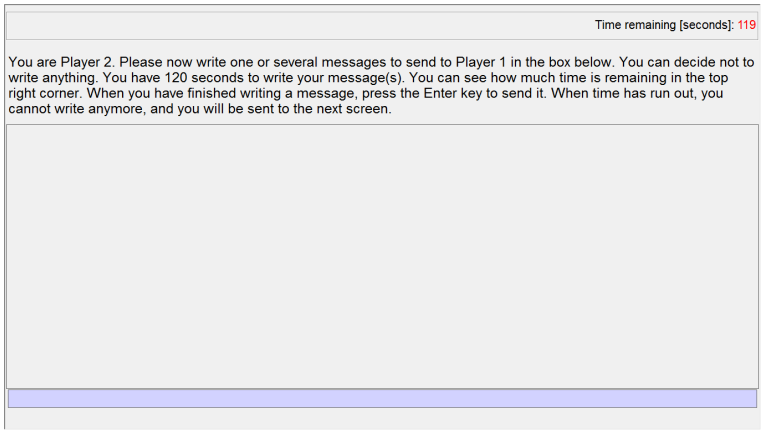

Please wait until the experiment continues.

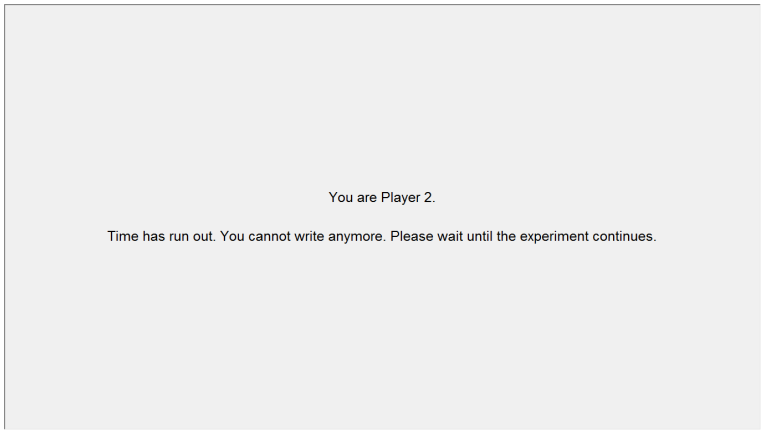

You are Player 2
Do you think Player 1's message was true or false?
True
False
Remember: The messages were:
Message 1: "Option A will earn you more money than Option B."
Message 2: "Option B will earn you more money than Option A."
Please press the OK button to continue
OK

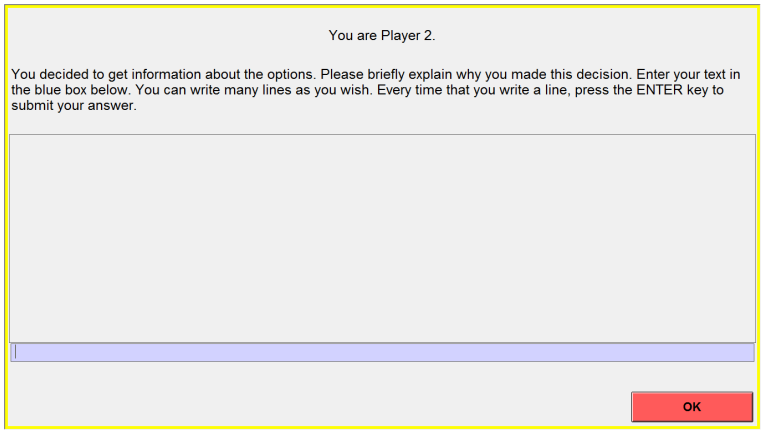

You are Player 2.
You chose Option A.
You earn £10
On the next screen you can decide to pay £1 to find out:
How much money Player 1 got from Option A, and
how much each of you would have gotten if you had chosen Option B?
Please press the OK button to continue
OK

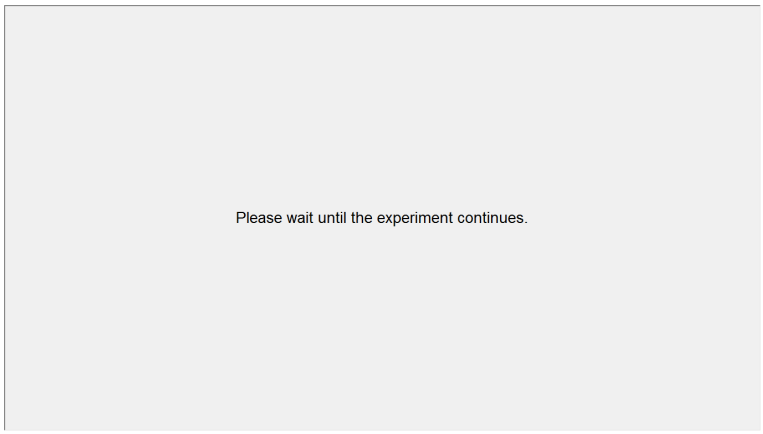

Time remaining [seconds]: 119
You are Player 2.
Do you want to pay £1 to find out:
How much money Player 1 got from Option A, and
how much each of you would have gotten if you had chosen Option B?
Yes
No


You are Player 2.
Player 1 chose to send this message to you:
"Option A will earn you more money than Option B"
You chose Option A.
You decided to find out how much both options gave you and Player 1.
The two options, A and B, are:
Option A: £10 to Player 1 and £10 to Player 2
Option B: £14 to Player 1 and £6 to Player 2
On the next screen you can write one or several messages to Player 1
Please press the OK button to continue
OK


Time remaining [seconds]: 119
You are Player 2. Please now write one or several messages to send to Player 1 in the box below. You can decide not to write anything. You have 120 seconds to write your message(s). You can see how much time is remaining in the top right corner. When you have finished writing a message, press the Enter key to send it. When time has run out, you cannot write anymore, and you will be sent to the next screen.


You are Player 2.
Time has run out. You cannot write anymore. Please wait until the experiment continues.


You are Player 2.
You decided to get information about the options. Please briefly explain why you made this decision. Enter your text in the blue box below. You can write many lines as you wish. Every time that you write a line, press the ENTER key to submit your answer.
OK


Please wait until the experiment continues.

Appendix C Receivers' Messages

Table 3: Receivers' Messages Exo-Info

Receiver's message	**ID**	**Sender's message**	**Receiver's option**
Cheers geeze. This is like that TV show golden balls Don't lure me into false hope I I'll set you a beer	1	1	A
	2	2	A
Great choice! thanks :)	3	1	A
lol I'm obviously not a very trusting person At least you were nice about it haha or were you being strategic because most people would have thought the other was lying? sneaky enjoy your £14 if only I was player one I'm just going to keep sending messages haah I'll trust you next time if we do it again please don't fuck me over :) apologies again for not trusting your original	4	1	B
Well played	5	1	A
Be truthful every time If you start lying, then I can find out after and I will be unsure what to pick next time	6	1	A

Continued on next page

Table 3 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option
Thank you for telling the truth	7	1	A
Cheers :)	8	1	A
sharing is caring what would Jesus do?	9	2	B
cheers, :D lets try and both get the most money out of this i like uea hehe	10	1	A
If you pick option A I will send you some dank memes, like A is a pretty swell deal, we both get £10 of dank cush. Option B is pretty alright too I guess, we both gen money for both but you don't get as many memes for it, so in all fairness it's not really a very good deal in the long run due to lack of memes. TLDR pick option A bro	11	1	A
	12	2	B
not cool man that is legit so annoying feel like such an idiot now	13	2	B
	14	1	A
Thank you :)	15	1	A

Continued on next page

Table 3 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option
	16	1	A
Thanks for telling me the truth!	17	1	A
Thank you! appreciate the honesty :)	18	1	A
Option A will get you more money than B *get you	19	1	A
Great choice! We both earned the same amount of money. That's fair! But I do feel sorry that you did not earn 14 pounds though.	20	1	A
Absolute legend! I knew i could trust you :) £10 richer whoop	21	1	A
enjoy your £4 lmao :)	22	1	B
Can I trust you after the last round?	23	2	B
Option A was good as we would have both got Âč10 each.	24	2	B
Knew you lied haha £10 each though :)	25	2	A
Thanks for the fair decision! You're awesome ;)	26	1	A
thanks!! i'll choose a similar option too, we'll both get more that way :)	27	1	A
SORRY YOU DIDNT GET THE 14 I GUESS	28	1	A

Continued on next page

Table 3 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option
Thanks for being honest. :)	29	1	A
Thanks for not pulling a fast one on me lmao	30	1	A
Is there any way we can maximise our reward further? If we work together, we can both earn £££s.	31	1	A
Thank you! Have a wonderful day :) Buy a lot of snacks	32	1	A
Eyyyyyy equal pay what a lovely thing to see	33	1	A
	34	1	A
Thanks mate for saying the truth...lets be honest throughout the whole game and gain as much Âč as possible for both of us!	35	1	A
choose option b hi	36	1	A
wooooow cheers.	37	2	B
Hello Player 1, many thanks for your honesty !! :)	38	1	A
You had to make the hard decision so I thought I'd take the less money but it worked out quite fair in the end	39	2	A

Note: In the second column, 1 means the Sender sent message 1, whereas 2 means the Sender sent message 2 (the false message). In the third column, A means the Receiver chose option A, whereas B means the Receiver chose option B.

Table 4: Receivers' Messages Endo-Costly-Info

Receiver's message	**ID**	**Sender's message**	**Receiver's option**	**Receiver's information decision**
I don't know what they want me to write. I trust you, so I hope I made a good choice. Thanks. This is weird.	1	1	A	2
i don't really know why I'm supposed to be writing you a message, but I hope you let me get lots of money hello i dont know if theres anymore rounds, but if one of the options os £100 let me have it and i'll split it with you not really i won't i'm very poor right now BYE	2	2	B	2

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
I'm in an overly cynical mood today so I thought you'd be lying in order to get more money, but it turns out you were giving me the better option. Or maybe you were double-bluffing? Either way, enjoy your money, I'm off to the shop to buy a sandwich	3	1	B	2
Merry Christmas! have a great holiday	4	1	A	2
I hope that you told me the truth	5	1	A	2
I don't know if you were being nice, or calling my bluff because you thought i'd mistrust you and select option B. Be truthful! Dont play games! £10 each pretty sweet	6	1	A	1
	7	1	A	2

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
Thank you player one :) i hope the distribution was fair.	8	1	A	2
Thank you for sending over that amount of money.	9	2	B	2
Trusting you buddy! Hope it works out in both of our favour. Same if there's another round If I'm player 1 I'll be honest too	10	2	B	2
Thank you for picking A. I made more money. Can you answer on here? Clearly not Just spent a pound trying to work out if you ripped me off. What a waste of a pound I could of bought half a snake bite with that	11	1	A	1

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
Thanks for the £6 I chose to believe that you acted honestly but I have no way of knowing this as I was not going to pay more money to find out so well done if you tricked me but if you did then that's sad :(is sad	12	2	B	2
Cheers for £10. Hope you got just as much :)	13	1	A	2
Well I can't completely complain, I got a tenner. That's a couple snakebites and a sandwich at the SU (Y). Completely*	14	1	A	2
if we both decide to be honest we can both make a lot more money!	15	2	B	1
	16	1	A	2
I got £2	17	1	B	2

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
I think that you were telling the truth...so thank you!	18	1	A	2
Did you earn more than £10? Were you telling the truth?	19	1	A	2
you liar :P	20	2	B	1
Thanks, got £10 for doing nothing so cant really complain :-)	21	1	A	2
Thank you for your kind choice.	22	1	A	1
Were you telling the truth that option A would've got me the most money? Did we get the same amount of money each? If we did thank you.	23	1	A	2
Hi feel a bit betrayed ? hello	24	2	B	1
what made you pick option a?	25	1	A	1

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
I believe you sent me the false options so that you could earn more money than me. I did think about reverse psychology but I went with my instincts	26	2	A	2
hi there so i of c chose option A thanks for the advice ill do the same for you :)	27	1	A	2
Hola amigo gimme yo money	28	2	A	2
hello	29	2	B	2
Hi idk really what to say but this is fun Interesting how A is greater than B but at the same time B is meant to be greater than A	30	1	A	2
I said that i trusted you that by clicking option B I got more money... wonder how much you got from this, I got £6 Enjoy your lunch XR	31	2	B	2

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
	32	1	A	1
how much did you get if i may ask I dont know if you are typing but we dont have long wait nevermind you cant reply but anyways, i would rather have a 100% chance of winning even money with you than have a 50 50 chance	33	1	B	2
Let's earn some money, big boy returns :) I won't do you dirty Please don't do me dirty	34	2	B	2
I am always going to alternate yes/no so what option you give me does not matter.	35	1	A	1
Moose are really big Like genuinely massive	36	1	A	2

Continued on next page

Table 4 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
sorry i didnt choose to check how much each option can earn i have no idea what's going on	37	1	A	2
tenner - aint bad	38	1	A	2
I chose to trust what you said, to choose B over A as, whilst I have no reason to trust you, I also had no reason to distrust you; I also chose not to look at the other option so I still don't know if trusting you was the right thing or not	39	2	B	2

Note: In the third column, 1 means the Sender sent message 1, whereas 2 means the Sender sent message 2. The false message is message 2. In the fourth column, A means the Receiver chose option A, whereas B means the Receiver chose option B. In the fifth column, 1 means the Receiver did get information ex-post, whereas 2 means the Receiver didn't get information ex-post.

Table 5: Receivers' Messages Endo-Free-Info

Receiver's message	**ID**	**Sender's message**	**Receiver's option**	**Receiver's information decision**
	1	2	B	1
hello not entirely sure whats happening but its nice to meet u	2	2	B	2
fair play	3	2	B	1
Hey. I'm always going to choose the option that is most fair to both of us :)	4	1	A	1
	5	1	B	1
You Hero, thank you for being a decent person	6	1	A	1
Thank you :) Cooperation is key	7	1	A	1
thanks for not tricking me into going for option b where you could've earned 4 pounds more.	8	1	A	1

Continued on next page

Table 5 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
thank you for recommending the fairer option. :)	9	1	A	1
thanks	10	1	A	1
lol, liar liar pants on fire. We are here for the money though, fair play to you.	11	2	B	1
Thank you for being honest! At least I think you were... Either way we both got a fair amount of money! Have a lovely day!	12	1	A	1
Thank you for being honest :)	13	1	A	1
Sorry, I will follow your instructions now. I wasn't sure if you would be fair or not. Let work together. Let's*	14	1	B	1
Thank you! Same next time?	15	1	A	1

Continued on next page

Table 5 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
continue to choose the option where we both gain the same amount so we both earn decent amount - if we you don't then i might choose random options as i don't know whether they are true or false statements	16	1	A	1
Cheers for splitting the money evenly. Let's keep this system for the rest of the experiment	17	1	A	1
Option A is the fair amount for both of us I am glad I made the most fair decision	18	2	A	1
Thank You	19	1	A	1
fair play, both got £10 wahey	20	1	A	1
Hi. I trust you. Have fun.	21	1	A	2
	22	2	A	1
	23	1	A	1

Continued on next page

Table 5 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
Thanks for the honesty :)	24	1	A	1
Nice Job! We can always switch :)	25	2	B	1
	26	1	B	1
Fair enough. At the end of the day, we're all just here to get paid. Wish it'd been a 10/10 split though. Be sure to treat yourself with those dollaroos.	27	2	B	1
Hello. I choose option B. Have a nice day.	28	1	B	1
Thank you for being honest i want you to know i would have done the same	29	1	A	1
Thank you, any option would have been fine to me but i greatly appreciate your choice- I always would have stuck with your decision :)	30	1	A	1

Continued on next page

Table 5 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
Choose Option 1 again.	31	1	A	1
	32	1	A	1
Trust	33	1	A	1
Thank you for being honest!	34	1	A	1
We both won!! I really thought I had got the lower amount at first But you chose honestly to split it, so thank you!! I think other pairs probably had more money given to them like £50 I wonder how they got on lol	35	1	A	1
I trust you	36	1	A	2
wooooow screwed me over for £4? was it really worth it? I hope you spend your £14 on something worthwhile	37	2	B	1
Sometimes, I dream about cheese	38	2	B	1

Continued on next page

Table 5 – continued from previous page

Receiver's message	ID	Sender's message	Receiver's option	Receiver's information decision
	39	1	B	1
I got you more money :D	40	1	B	1
	41	1	A	1

Note: In the third column, 1 means the Sender sent message 1, whereas 2 means the Sender sent message 2. The false message is message 2. In the fourth column, A means the Receiver chose option A, whereas B means the Receiver chose option B. In the fifth column, 1 means the Receiver did get information ex-post, whereas 2 means the Receiver didn't get information ex-post.