Complexity and Responsibility Attribution: Pre-Analysis Plan

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Abstract

We present the motivation for, and the design of, a laboratory experiment on the relationship between policy area complexity and accountability.

1 Responsibility Attribution

Recent work on responsibility attribution has focused on how the competency of competing political candidates (or agents) shapes vote choice (Duch and Stevenson, 2008; Fearon, 1999; Gordon and Landa, 2009; Ashworth and Bueno de Mesquita, 2008; Ashworth, Bueno de Mesquita and Friedenberg, 2017) But as Duch and Stevenson (2008); Duch, Przepiorka and Stevenson (2012) point out we have a relatively underdeveloped understanding of exactly how principals (voters) attribute responsibility for the policy performance of Agents. Empirically, Duch, Przepiorka and Stevenson (2012) and Duch and Matsuo (2015) have recently provided insights into how individuals attribute responsibility to individual agents involved in collective decision making – a critical insight for understanding how voters respond to the policy outcomes of coalition governments. However, a key question that has received little attention is how responsibility attribution heuristics employed by principals affect opportunities for rent seeking behaviour and shirking by political agents. This is the question motivating the present study. We present a theoretical perspective and provide an experimental analysis of how principals attribute responsibility to and assess the competency of their agents when, in a strategic setting, they observe agents' performance on tasks that vary in terms of complexity or difficulty.

The essay proceeds as follows: First, we describe a principal-agent model with (unobserved) agent effort choices on two tasks, with varying or similar complexity. The model predicts the effort levels we should expect agents to choose on these two tasks and the principals' retention decisions based on their attributions of responsibility for the observed policy outcomes. The equilibrium effort levels are conditional on the complexity of each task and on the voters' retention (re-election) rules. This implies that the importance of issues/policy areas in the vote utility function should vary depending on the complexity of tasks for which elected officials are held accountable in any election. And further, in equilibrium, that it must reflect the expectations of how agents would respond to the expected retention rules, which are, themselves, contingent on issue complexity.

The prediction of the relationship between the importance of issues/policy areas in the vote utility function and the complexity of those areas can be evaluated with survey-based measures, and we do so in the second part of this essay, drawing on survey data from Duch and Stevenson (2008). The evidence suggest strongly that principals, indeed, vary responsibility attribution for each task subject to the particular pattern of complexity shared by the policy dimensions. Although this evidence is suggestive, we are reluctant to draw from it causal inferences given that it is difficult to know precisely what independent exogenous information respondents in these surveys learn about incumbent competency and how they assess the complexity of the policy tasks. This motivates the design of our lab experiments that are described and analyzed in the third part of the paper. Because the lab setting allows us to isolate the strategic feedback between principals and agents in a controlled environment, it is a perfect context in which to evaluate the jointly determined effects of policy area complexity on agent behaviour and principals' choices of agent retention retention rules.

Taken together, the results we report confirm that principals recognize that policy tasks vary in terms of complexity; that principals' assessments of agents' competency incorporate information about both complexity and performance; and that information regarding the competency of agents varies conditional on the complexity of the policy dimensions, creating opportunities for strategic shirking behaviour on the part of agents.

2 Theory

2.1 The game

We analyze the interaction between a Principal[1] and an Agent charged with policy-making in two distinct areas, a_1, and a_2.[2] The Agent chooses whether to exert effort in one, both, or neither of these areas. We denote $a_i = 0$ the choice of the Agent not to exert effort in area $i = 1, 2$, and $a_i = 1$ the choice to exert effort.[3]

The outcome in area i, $o_i \in \{s, f\}$, where s stands for *success* and f for *failure*, depends stochastically on the effort choice a_i and on the Agent's competence.[4]. Specifically, we assume that each Agent can be of one of two types $\theta \in \{\theta_L, \theta_H\}$ with $Pr(\theta = \theta_H) = \pi \in (0, 1)$. If the Agent chooses to exert effort in area i, i.e. chooses $a_i = 1$, then the probability of success is p_i^L if the Agent is of low competence θ_L, and p_i^H if the Agent is of high competence θ_H with $0 < p_i^L < p_i^H \leq 1$. Further, if the Agent chooses not to exert any effort, then the probability of success is 0 independent of his type.

In the spirit of the career-concerns framework, we assume that although the distribution of Agent types is commonly known, the true type/competence is unknown ex ante, including to the Agent herself. The ex ante probability of success from choosing $a_i = 1$ is $\pi p_i^H + (1-\pi) p_i^L =: p_i$. We interpret p_i as representing the difficulty, or, consistent with the usage in the literature on political economy and public administration of organizations (March and Olsen, 1995), *complexity of the task i*. It is immediate that the lower p_i, the

[1]Depending on the application the Principal may be thought of as the electorate, a Prime Minister or a President.

[2]Throughout, we refer to the Agent as being responsible for a policy task, field, or area interchangeably.

[3]The model of agency relationship in which the Agent chooses an allocation of a budget between graft and investment into the policy success generates equivalent results.

[4]The assumption of binary-valued outcomes is plausible in many contexts. One reason is that the outcomes of some – though, of course, not all – important policy tasks are clearly discrete. But another is that even when policy outcomes are continuous, voters often have little knowledge with which to evaluate them and so rely on categorical evaluations supplied by others – the responsible officials themselves, or their political opponents (Delli Carpini and Keeter, 1997)

less control the Agent has over success or failure on policy task i.

The Principal observes the outcome of the Agent's actions on each task but not the actions themselves.

Upon observing the outcomes o_1 and o_2, the Principal makes her retention decision. If the Principal dismisses an Agent, then the replacement is of high competence with probability π. To summarize, the order of play is as follows:

1. The Agent chooses whether to exert effort in area i, i.e. the Agent chooses $(a_1, a_2) \in \{(0,0),(0,1),(1,0),(1,1)\}$.

2. Nature chooses the Agent's competence $\theta \in \{\theta_L, \theta_H\}$ and the outcomes $o_i \in \{s, f\}, i = 1, 2$.

3. The Principal observes the outcomes o_1 and o_2 and subsequently chooses whether to retain the Agent.

The Principal prefers success in each area and receives payoff $u_P(o_i = s) > 0$ from success in area i and 0 from failure. The Principal receives an additional payoff of $R > 0$ for each area i for retaining an Agent of high competence.[5] As a consequence, the Principal only retains the Agent if the Principal believes, upon observing the policy outcome(s), that this Agent is of type θ_H with probability superior or equal to π.[6]

The Agent values retention and prefers to avoid effort. More specifically, the Agent receives an additional payoff of $B > 0$ when retained and a payoff of zero when dismissed from office. Let $k > 0$ be the cost to the Agent of choosing to exert effort, i.e. $a_i = 1$. The costs are additively separable, i.e. the Agent incurs cost $2k$ when choosing to exert

[5]This additional payoff may be thought of as the value added to the Principal of having in office a high type, which, in a more general model may be derived from an explicitly modelled continuation game.

[6]Thus, we abstract away from the possibility of primitive heterogeneous valuation of tasks by the Principal, as in Ashworth, Bueno de Mesquita and Friedenberg (2017), the differences in the Principal's responsiveness to tasks in our model are induced entirely by the expectations of the Agent's choices.

effort on both tasks, i.e. $(a_1 = 1, a_2 = 1)$.[7]

2.2 Interpreting issue complexity

By complexity we mean a property of issue dimensions or tasks that induces the performing agent's conditional likelihood of success. In particular, more complex tasks are those tasks for which the expected likelihood of failure is sufficiently high – either because the prior likelihood that the performing agent is a high-competence type is sufficiently low (π is low, while p_i^H is high and p_i^L is low), or because the likelihood of success is still low, even conditioning on the agent being a high type (both p_i^L and p_i^H are low).

In the formulation of the model described above, competence can be thought of as transportable across issues. The agent who is a high (low) type with respect to one policy area is a high (low) type with respect to the other, as well. For this formulation, a primary determinant of competence may be agents' managerial abilities and judgement, rather than field expertise. A high type of state attorney general is, in this sense, not dissimilar from a high type of state governor or another high-ranking state official. The tasks that such bureaucrats are expected to perform entail directing institutional effort, which may present different kinds and degrees of challenge within different bureaucracies, but need not require inconsistent competences. (The key predictions we consider are robust to allowing a wedge between the area-specific competences, so long as it is not too great).

2.3 Analysis

We restrict attention to pure strategy Perfect Bayesian equilibria in weakly undominated strategies and consider equilibrium status of two kinds of retention rules: the *strict incentives* retention rule, which, for retention, requires success on both policy issues, and

[7] Landa and Le Bihan (2019) extend the model to settings with interactions between tasks. The general thrust of the results goes through so long as the substitution between tasks is not too strong.

the *moderate incentives* retention rule, which awards retention if there is *success* on at least one issue.

Our main predictions describe when we see these two retention rules used in equilibrium when the Principal's choice is able to induce maximal effort allocation from the Agent – i.e. when the Agent exerts effort on both tasks.

Proposition 1 *In equilibrium with maximal effort, the Principal retains with the strict incentives retention rule when*

1. *the complexity of each task is sufficiently low,* $e_i \geq \frac{2k}{e_j B}$, *and*

2. *the Principal's estimation of the Agent's competence decreases unless the outcome is success on both tasks,* $e_i^H(1-e_j^H) \leq e_i^L(1-e_j^L)$ *for all* $i = 1, 2$.

Proposition 2 *In equilibrium with maximal effort, the Principal retains with the moderate incentives retention rule when*

1. *the complexity of each task is intermediate,* $1 - \frac{k}{e_j B} \geq e_i \geq \frac{k}{(1-e_j)B}$, *and*

2. *the Principal's estimation of the Agent's competence increases when the outcome is success on at least one task,* $e_i^H(1-e_j^H) \geq e_i^L(1-e_j^L)$ *for all* $i = 1, 2$.

Our argument suggests that the weight Principals accord to different tasks or policy outcomes will be conditioned on their respective complexity or difficulty. In equilibrium, principals could accord less weight to any single task (that would be the case if both tasks were complex); they could favor one task over the other (when asymmetric complexities obtain); or they could accord high weights to both tasks (when both tasks are relatively low-complexity).

3 Experimental design

The theoretical arguments derived from the model described above will be tested in a series of laboratory and survey experiments. To get a full view of the mechanisms at work, we will study settings (1) in which Agents are identical in terms of competence (pure moral hazard), and (2) in which Agents vary by competence (career concerns framework). In the career concerns framework, we will consider treatments in which prospective and retrospective considerations reinforce each other, and treatments in which they do not. At the present moment, we only have collected data on the case with two policy areas and pure moral hazard. We give a detailed presentation of the experimental treatments and the equilibrium in these treatments below.[8]

3.1 Moral Hazard Treatments

Subjects are randomly assigned to the roles of Principal and Agent and randomly matched into Principal and Agent pairs at the beginning of each round. Following the match, in each round:

1. Principal and Agent are told about the complexity e_1, e_2 of the two tasks. In the experiment the Agent will choose whether to pay to play a lottery that will yield success with probability e_i and failure with probability $1 - e_i$. We consider two treatments: (1) *Low-complexity Treatment*: $e_1 = e_2 = .8$; and (2) *High-complexity Treatment*: $e_1 = e_2 = .5$. The Agent can choose not to pay for the lottery in which case the probability of success is 0.

2. Principal announces retention rule. Retention rule could be one of five candidates: (1) Never retain, (2) Retain if and only if success on both tasks, (3) Retain if and

[8] The detailed instructions are available in the Appendix and screen shoots of the experiment along with O-Tree code are available at https://github.com/rayduch/Complexity-and-Responsibility-Attribution

only if success on either task, (4) Retain if and only if success on at least one task, (5) Always retain. In the last three rounds of each module, we elicit beliefs by asking the Principal what tasks s/he believes the Agent will perform.

3. Agent decides whether to perform (1) both tasks, (2) only task 1, (3) only task 2, (4) neither. The Agent who has an endowment of 300 ECUs is being charged a cost 150 ECUs for each task he performs.

4. Principal observes outcomes on each task (but not the effort choice by the Agent). In a separate treatment, we then ask the Principal whether s/he wants to stick with the retention decision implied by the announced retention rule or change the retention decision. If the Principal wants to change his retention decision, he can either keep although he said he would fire. Or he can fire although he said he would retain.

Payoffs:

1. The Principal receives a positive additional amount of 280 ECUs whenever the outcome is success. Nothing when failure.

2. In the rounds where the Principal is asked what they expect the Agent to do, they receive an additional 140 ECUs for each correct guess.

3. The Agent has an endowment of 300 ECUs, pays a fee of 150 ECUs from his endowment when choosing to pick up a task, and receives an additional 900 ECUs if retained.

The subjects play 4 practice rounds, with each subject playing 2 rounds as an Agent and 2 as a Principal, and are asked to fill in a questionnaire after the end of the practice rounds to solidify and verify their understanding of the experimental protocol.

Following the questionnaire, the paid session commences, with subject payments corresponding to their earnings in randomly drawn rounds of play in this session. Subjects play 10 rounds in a fixed role, i.e. always as Principal or always as Agent (Module 1). In each new round, subjects are rematched without replacement. After 10 rounds, the role assignments are switched and subjects play another 10 rounds in their new role, with the same random re-matching protocol. (Module 2). The subjects are not told in advance that the switch will occur.

Following Module 2, there is Module 3, in which we elicit subjects' risk preferences.

4 Analysis Plan

We now present the equilibrium predictions for the two moral hazard treatments. Notice first that if the Principal never retains or always retains, the Agent has no incentive to exert effort in either area. Therefore, these two retention rules are (at least weakly) dominated and can be disregarded in the following analysis.

Consider first the *Low-complexity Treatment*: $e_1 = e_2 = .8$. Here we have the following prediction (a corollary to Proposition 1 above):

Result 1 *In the highest effort equilibrium in the* Low-complexity Treatment *(*$e_1 = e_2 = .8$*), the Agent exerts effort in both areas, and the Principal retains if and only if the outcome in each area is Success.*

The argument for this result runs as follows. Suppose the Principal chooses to retain if and only if the outcome is Success in both areas. Then the expected utility of the Agent for the different effort choices is as follows:

Expected utility from exerting effort in both areas is 300 ECUs - 150 ECUs (effort in area 1) - 150 ECUs (effort in area 2) + $.8 \times .8 \times$ 900 ECUs = 576 ECUs.

Expected utility from exerting effort in a single area (WLOG, say area 1) is 300 ECUs - 150 ECUs (effort in area 1) = 150 ECUs.

Expected utility from exerting effort in neither area is 300 ECUs.

Hence, if the Principal retains if and only if she observes Success in both areas, the Agent's best response is to exert effort in both areas. In equilibrium, the expected utility to the Principal of using this strict retention rule is thus $.8 \times 280 + .8 \times 280 = 448$ ECUs.

If on the other hand, the Principal retains if and only if she observes Success in either area (WLOG, say area 1), then the Agent clearly has no incentive to exert effort in both areas, and the Principal's expected utility is at most $.8 \times 280 = 224$ ECUs.

Finally, if the Principal retains if and only if she observes Success in at least one area, then the Agent's expected utilities from the different effort choices is as follows:

Expected utility from exerting effort in both areas is $300 - 150 - 150 + .8 \times 900 + .8 \times 900 - .8 \times .8 \times 900 = 864$ ECUs .

Expected utility from exerting effort in a single area (WLOG, say area 1) is $300 - 150 - 0 + .8 \times 900 = 870$ ECUs

Expected utility from exerting effort in neither area is 300 ECUs. Hence, if the Principal retains if and only if she observes Success in at least one area, the Agent's best-response is to exert effort in a single area. In this case, the Principal's expected utility from retaining if and only if she observes Success in at least one area is $.8 \times 280 = 224$ ECUs.

It follows that the equilibrium in the *Low-complexity Treatment*: $e_1 = e_2 = .8$ has the Principal retaining if and only if the outcome is Success in both areas, and the Agent exerting effort on both areas.

Consider now the *High-complexity Treatment*: $e_1 = e_2 = .5$. Here we have the following result (a corollary to Proposition 2 above):

Result 2 *In the highest effort equilibrium in the* High-complexity Treatment *(*$e_1 = e_2 =$

$.5$*), the Agent exerts effort in both areas, and the Principal retains if and only if the outcome is Success in at least one area.*

Suppose the Principal chooses to retain if and only if she observes Success in both areas. Then the expected utility of the Agent for the different effort choices is as follows:

Expected utility from exerting effort in both areas is 300 ECUs - 150 ECUs (effort in area 1) - 150 ECUs (effort in area 2) + $.5 \times .5 \times$ 900 ECUs = 225 ECUs.

Expected utility from exerting effort in a single area (WLOG, say area 1) is 300 ECUs - 150 ECUs (effort in area 1) = 150 ECUs.

Expected utility from exerting effort in neither area is 300 ECUs.

Hence, if the Principal retains if and only if she observes Success in both areas, the Agent's best response is to exert effort in neither. The expected utility to the Principal of using this strict retention rule is thus 0.

If on the other hand, the Principal retains if and only if she observes Success in either area (WLOG, say area 1), then the Agent clearly has no incentive to exert effort in both areas, and the Principal's expected utility is at most $.5 \times 280 = 140$ ECUs.

Finally, if the Principal retains if and only if the outcome is Success in at least one area, then the Agent's expected utilities from the different effort choices are as follows:

Expected utility from exerting effort in both areas is $300 - 150 - 150 + .5 \times 900 + .5 \times 900 - .5 \times .5 \times 900 = 675$ ECUs .

Expected utility from exerting effort in a single area (WLOG, say area 1) is $300 - 150 - 0 + .5 \times 900 = 600$ ECUs .

Expected utility from exerting effort in neither area is 300 ECUs.

Hence, if the Principal retains if and only if she observes Success in at least one area, the Agent's best-response is to exert effort in both areas. In this case, the Principal's expected utility from retaining if and only if the outcome is Success in at least one area is $.5 \times 280 + .5 \times 280 = 280$ ECUs.

It follows that the equilibrium in the *High-complexity Treatment* ($e_1 = e_2 = .5$) has the Principal retaining if and only if the outcome is Success in at least one area, and the Agent exerting effort in both areas.

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Complexity Experiment Instructions

Introduction

This is an experimental session on group decision-making. In this session you will make a series of choices. At the end of the session, you will be paid depending on the specific choices that you made during the session and the choices made by other participants.

This session has 4 modules, each with its own experiment, and you will be able to earn money in each module. Your total earnings will be the sum of your payoffs in each module plus the show-up fee of $1000. Each module will start with a brief instruction period, after which we complete that module.

If you have questions during the instruction period, please raise your hand after I have completed reading the instructions. Your questions will be answered out loud so everyone can hear. Please restrict these questions to clarifications about the instructions only. If you have any questions after one of paid parts of the session has begun, raise your hand, and I will come and assist you. Apart from the questions directed to the experimenter, you are expressly asked to refrain from communicating with other participants in the session.

Introduction to the Experiment in Module 1

The experiment in Module 1 will consist of 10 different rounds. At the beginning of the first round, you will be randomly assigned a role of either Player 1 or Player 2. You will keep that role for the remainder of this experiment.

In each round, all participants will be randomly matched into pairs, each consisting of one Player 1 and one Player 2. In each new round, the participants will be re-matched into pairs, always matched with a new/different participant. The composition of matched pairs will, thus, always be different in different rounds of this experiment. All of participants' interactions will take place anonymously through a computer terminal, so your true personal identity will never be revealed to others, and you will not know who precisely is in your pair in any round of the experiment.

In each round of the experiment, the subject in the role of Player 1 makes choices that affect the outcomes with respect to two Tasks. For each of these Tasks, Player 1s choices are to pay a cost for increasing the probability that the outcome on that Task is Success or to forego that cost, with the consequence of the outcome on that Task is certain to be Failure.

If Player 1 chooses to pay the cost, the chance of Success on that Task is 5 out of 10 that is, there is a .5 probability of the outcome on that Task being Success. If Player 1 chooses not to pay that cost, then the outcome on that Task is Failure.

Player 2 will be paid depending on the outcome of the Tasks. Player 1 will be paid depending on Player 2s decision whether to reward Player 1.

Your earnings from this experiment will be determined by a random selection of two rounds for compensation.

Player 1 Instructions:

You are Player 1 in this game and have been randomly matched with Player 2.

In this game you will be asked whether you want to pay a cost to increase the probability of Success on ONE, BOTH, OR NEITHER OF 2 Tasks: Task 1 and Task 2. You have an initial endowment of 300 ECUs (remember that 300 ECUs=XX) that you can spend to increase the probability of Success on either Task. The cost to you of increasing the probability of Success on either Task is 150 ECUs. Thus, if you choose to pay the cost on one of the two Tasks, you will be deducted 150 ECUs from that rounds payoff. If you choose to pay the cost on both Tasks, you will be deducted 300 ECUs from that rounds payoff. If you choose to not pay the cost on either Task, you will keep your 300 ECUs.

Before you make your decision whether to pay the cost(s) to improve the probability of success on Tasks 1 and 2, Player 2 will be asked for what outcomes s/he will Retain you or Fire you.

Here are the Reward Decision rules Player 2 can announce:

- NEVER Reward Player 1
- Reward Player 1 if Outcome is Success on BOTH Tasks
- Reward Player 1 if Outcome is Success on at least one Task (that is, on Task 1, OR on Task 2, OR on BOTH Task 1 AND Task 2)
- Reward Player 1 if Outcome is Success on a single Task (Task 1 OR Task 2)
- ALWAYS Reward Player 1

SAMPLE DECISION SCREENS:

Reward Rule Announcement Screen Player 2 has announced:

ALWAYS Reward Player 1

Decision Screen for Player 1

Do you want to pay the cost on Task 1 the cost is 150 ECUs and the chance of Success is 5 out of 10: YES/NO

Do you want to pay the cost on Task 2 the cost is 150 ECUs and the chance of Success is 5 out 10: YES/NO

Suppose you chose to pay the cost on Task 1 but not to pay the cost on Task 2. After the outcomes on the two Tasks are realized, both Players 1 and 2 will see the following screen:

Outcome Screen:

Task 1 The outcome on Task 1 is Failure

Task 2 The outcome on Task 2 is Success

If Player 2 chooses to reward you, you will earn an additional 900 ECUs that round. If s/he chooses not to reward you, you will not earn any additional money that round.

For example, for the choices described on the sample screens above, given the reward rule announced by Player 2, you would be rewarded, and so your total earnings for this round would be: 300 ECUs (endowment) - 150 ECUs (Task 1) - 0 ECUs (Task 2) + 900 ECUs (reward) = 1050 ECUs.

Player 2 Instructions:

You are Player 2 in this game and have been randomly matched with Player 1.

Player 1 has an initial endowment of 300 ECUs. That player can use this endowment to pay a cost to increase the probability of Success on ONE, BOTH, OR NEITHER OF 2 Tasks Task 1 and Task 2. The cost to Player 1 of increasing the probability of Success on either Task is 150 ECUs. Thus, if Player 1 chooses to pay the cost on one of the two Tasks, s/he will be deducted 150 ECUs from that rounds payoff. If s/he chooses to pay the cost on both Tasks, s/he will be deducted 300 ECUs from that rounds payoff. If s/he chooses not to pay the cost on either Task, s/he will keep her round endowment of 300 ECUs.

If Player 1 chooses to pay the cost on a given Task, the chance of Success on that Task is 5 out of 10, that is, there is a .5 probability of the outcome on that Task being Success. If Player 1 chooses not to pay that cost, then the outcome on that Task is Failure.

Depending on the outcomes on the two Tasks, you can earn money.

In each round, before observing the outcomes on the Tasks, you will first choose a rule that determines when Player 1 is rewarded contingent on the outcomes on the Tasks. Your choices will be:

- NEVER Reward Player 1
- Reward Player 1 if Outcome is Success on BOTH Tasks
- Reward Player 1 if Outcome is Success on at least one Task (that is, on Task 1, OR on Task 2, OR on BOTH Task 1 AND Task 2)
- Reward Player 1 if Outcome is Success on a single Task (Task 1 OR Task 2)
- ALWAYS Reward Player 1

If according to the reward rule you announced, Player 1 is reward, Player 1 will earn an additional 900 ECUs. If according to the reward rule you announced Player 1 is fired, then Player 1 will not earn any additional money.

In some, but not all rounds, you will also be asked to make a second choice: a guess of what choices Player 1 is going to make.

The payoff you will receive for the round will depend on two things: the outcomes on each task, and, if you are asked, your guesses of Player 1s choices. For each Task outcome of Success, you will gain 500 ECUs. And for each correct guess of Player 1s choice, you will gain 140 ECUs.

To illustrate: suppose, as in the example above, that Player 2 chose Always Reward. Suppose, further, that Player 2 was asked to guess what Player 1 would choose, and guessed correctly on both Tasks.

If the outcomes on both Tasks turn out to be Success, then Player 2 will receive 500 ECUs (Task 1) + 500 ECUs (Task 2) + 140 ECU (guess on Task 1) + 140 ECU (guess on Task 2) = 1280 ECUs.

If the outcome on Task 1 is Success but the outcome on Task 2 is Failure, then Player 2 receives 500 ECUs (Task 1) + 0 ECUs (Task 2) + 140 ECU (guess on Task 1) + 140 ECU (guess on Task 2) = 980 ECUs.

If the outcome on Task 1 is Failure but the outcome on Task 2 is Success, then Player 2 receives 0 ECUs (Task 1) + 500 ECUs (Task 2) + 140 ECU (guess on Task 1) + 140 ECU (guess on Task 2) = 980 ECUs.

If the outcome on both Tasks is Failure, then Player 2 receives 0 ECUs (Task 1) + 0 ECUs (Task 2) + 140 ECU (guess on Task 1) + 140 ECU (guess on Task 2) = 280 ECUs.

SAMPLE DECISION SCREEN FOR PLAYER 2 First Decision Screen for Player 2 Choose a decision rule for Rewarding Player 1:

NEVER Reward Player 1 Reward Player 1 if Outcome is Success on BOTH Tasks Reward Player 1 if Outcome is Success on at least one Task (that is, on Task 1, OR on Task 2, OR on BOTH Task 1 AND Task 2) Reward Player 1 if Outcome is Success on a single Task (Task 1 OR Task 2) ALWAYS Reward Player 1

Second Decision Screen for Player 2 What do you believe Player 1 will do?

Player 1 will pay the cost on Task 1 YES/NO Player 2 will pay the cost on Task 2 YES/NO

Outcome Screen The outcome on Task 1 is Success The outcome on Task 2 is Success

STOP SUBJECT INSTRUCTIONS HERE

Instruction Screen for the Experiment in Module 2:

The experiment in Module 2 has the same rules as the experiment in Module 1. The only difference is that your role in the new experiment will be as Player 1 if you were Player 2 in the previous experiment, and Player 2 if you were Player 1 in the previous experiment. Otherwise, the interactions in the new experiment will follow the same rules as before. This module of the session is the last module of that game. Modules 3 and 4 will have different rules we will announce later.

[AFTER 10 ROUNDS OF PLAY in Module 2] Payoff Screen:

You have played 20 rounds in Modules 1 and 2 Three of these 20 rounds have been randomly selected in order to determine your earnings for these 10 rounds Rounds x, y, and z were chosen Your earnings for these rounds were XXX ECUs, YYY ECUs, and ZZZ ECUs. Your total earnings in the session so far are XXX+YYY+ZZZ = VVV ECUs.

Module 3: Risk Preferences a) In this Module you will make ten choices, but only one of them will be used in the end to determine your earnings in this module. Each decision is a paired choice between "Option A" and "Option B." After you have made all of your choices, the server will select at random one of the ten decisions to be used, and a second random selection will determine what your payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used. Obviously, each decision has an equal chance of being used in the end. b) The sort of decisions you are going to make are the following: Decision 1, Option A pays 2,00 pounds with probability 10%, and it pays 1,60 pounds with probability 90%. Option B yields 3,85 pounds with probability 10%, and it pays 0,10 pounds with probability 90%. The other Decisions are similar, except the chances of the higher payoff for each option increase. In fact, for Decision 10, the second selection will not be needed since each option pays the highest payoff for sure, so your choice here is between 2,00 pounds or 3,85 pounds. c) These Earnings will be added to your previous earnings, and you will be paid all earnings in cash when we finish.

Module 4: Die Game - or some version for compensation of questionnaire

Complexity Experiment Screen Shots