Interim Performance Evaluation of Career Concerned Agents*

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Abstract

The timing of performance feedback is a central managerial decision. This paper studies interim performance evaluations (IPEs) in a two-period signaling model in which career-concerned agents privately know their ability. Revealing first-period performance allows agents to condition second-period effort on the first-period outcome. This flexibility creates two opposing forces: agents may stop exerting effort after an early success, while the option to continue after a failure can make first-period effort more attractive. The net effect depends on the cost of effort. Below a unique threshold, total effort is higher without IPE; above it, total effort is higher with IPE. I test the model at a cost above this threshold in a laboratory experiment with two task environments: an abstract task with randomly assigned ability and a quiz task in which ability reflects prior knowledge. The experiment also varies whether IPE is assigned exogenously or chosen by the principal. Total effort is significantly higher under IPE in both task environments and under both assignment modes. The predicted reduction in second-period effort after an early success receives at most marginal support in the abstract task and reverses in the quiz task. Consequently, IPE raises total effort by more than the model predicts.

Keywords: Interim Performance Evaluation, Career Concerns, Signaling, Feedback, Effort Provision, Laboratory Experiment

JEL: C73, C91, D82, D83, M12, D91.

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1 Introduction

Successful management of organizations requires a precise understanding of employees' incentives. One of the primary tasks and goals of leadership is to align employees' efforts with the company's interests. From the employee's perspective, multiple incentives are at play in the workplace, one of which is career concerns (Holmström, 1999). These concerns can be modeled within a signaling game framework, in which the desire to signal one's privately known talent influences the willingness to exert effort (Spence, 1978). The prerequisites for such a signaling game include private information about the agent's competence, successful task execution as a function of ability and effort, and a reputation for high competence as part of the agent's utility function. In equilibrium, such a signaling game can lead to partial separation of more talented from less talented employees, benefiting the company through higher levels of effort provision. Information can influence such equilibria, and one of the tools available to managers is control over the flow of information within the company. This project focuses on the implications of one specific tool that influences information flow: an Interim Performance Evaluation (IPE).

The literature on IPEs typically assumes that the principal is better informed about the quality of the agent's work than the agent himself. Furthermore, most existing studies assume initial symmetric information about the agent's ability (Fuchs, 2015; Suvorov and Van de Ven, 2009; Zhang, 2019; Chen, 2015; Ederer, 2010; Gürtler and Harbring, 2010; Hansen, 2013), or do not account for different ability types (MacLeod, 2003; Fuchs, 2007; Maestri, 2012; Lang, 2019; Goltsman and Mukherjee, 2011). In this paper, I also assume that the principal is better at judging the quality of the agent's work but deviate from the existing literature by assuming the agent has superior knowledge about their own talent.[1] For example, a principal might be informed about the grades a recent graduate achieved or read about the agent's intelligence in a recommendation letter from a former employer. The agent, however, is more aware of whether the grades were a result of ability or diligence during his studies. Similarly, the agent likely has a better understanding of the accuracy of the recommendation letter, such as whether the former employer was lenient in writing it. In a new work environment, the experienced principal may still be better informed about the quality of work, while the agent remains better informed about his own level of ability. The impact of an IPE in a career-concern model with these assumptions has not yet been explored.

[1]An exception in the IPE literature is Chen and Stephen Chiu (2013), who also assume the agent is privately informed about their own talent. However, their paper does not feature career concerns and assumes a different connection between first- and second-period output.

To model such a situation, I explore a game that consists of two periods and involves two risk-neutral players: a principal (she) and an agent (he). The agent has a privately known type that determines his competence. In each period, the agent can choose whether to exert high effort at an exogenous cost. For a given effort provision, the probability of achieving success increases with the agent's type.[2] The principal's utility function positively depends on the successful production of high-quality output in each period. The principal observes the output quality for each period and updates her beliefs about the agent's type. As a shortcut for modeling career concerns, these beliefs (minus the potential costs of effort) determine the agent's payoff. Absent an IPE, the agent does not observe the output quality of the first period before making his second-period decision. It is publicly known whether the principal has implemented an Interim Performance Evaluation (IPE) protocol in her company. An IPE informs the agent about the output quality in the first period.[3] Hence, the main assumptions of the model are: 1) a career-concerned agent, 2) a principal capable of Bayesian updating, 3) costly, unobservable effort provision, 4) an agent who is privately informed about his talent, and 5) a principal who is (without IPE) privately informed about the quality of the agent's output.

The model is solved using Perfect Bayesian equilibrium, restricting attention to the equilibria with maximal signaling activity. The key mechanism is a conditional strategy that IPE enables: agents exert effort in the first period and only continue to exert effort in the second period if the first period did not result in success. Under NoIPE, agents cannot observe the first-period outcome before their second-period decision, so this conditioning is not possible. The conditional strategy creates two opposing forces. On the one hand, agents who succeed early stop exerting effort, because their first-period success has already sufficiently distinguished them from lower-ability agents and removed the signaling incentive for a second attempt. On the other hand, the option to try again only after a failure makes first-period effort more attractive, drawing in types who would not exert effort at all under NoIPE. Which force dominates depends on the cost of effort: below a unique threshold, NoIPE generates more total effort; above it, IPE does.

To test the validity of the assumptions and causally identify behavioral implications potentially relevant to the game, I conduct a controlled laboratory experiment. In this experiment,

[2] Success can be understood as, for example, fulfilling a client's needs or producing a high-quality good.

[3] Although much literature addresses subjective performance evaluations, this study focuses solely on objective evaluations. While I acknowledge that the principal might have an incentive to misreport the agent's performance, this possibility is excluded by design, as it is not the focus of this project. Objective evaluations can be motivated by factors such as a lying-averse principal, a long-lived principal who wants to maintain a reputation for honesty, or the outsourcing the IPE to a third party to ensure credibility, as is common (see, e.g., Klaas et al., 2001).

I vary the type of task performed, the existence of an IPE, and its endogeneity. Agents can choose whether to exert monetarily costly effort in each of two periods to succeed in producing high-quality output. The chance of success depends on the effort exerted and the agent's type. The agents' monetary incentive is based on the belief about his type held by another subject who observes whether success occurred in a given period. In the experiment, the implementation of an IPE is varied — either determined exogenously by a randomization device or chosen endogenously by the principal. This design allows for examining the role of reciprocity in the setup: a principal who chooses (not) to provide information that the agent might be interested in could influence effort provision through positive (negative) reciprocity.

To assess the effect of intrinsic motivation, half the subjects play in an *Abstract* context, and the other half play in a *Quiz* context. In the Abstract context, a type is randomly assigned to each agent, which determines the probability of success in a given period (given that the exogenous effort cost is paid). Intrinsic motivation is expected to be relatively low in this treatment. In the Quiz context, however, the agents' types are not induced but are based on their prior knowledge. The task consists of answering questions about the capitals of randomly selected countries. If an agent chooses to pay the exogenous cost and correctly answers at least 7 out of 10 questions, success is achieved. While the Abstract context closely tests the model, the Quiz context enhances external validity by using the subjects' true knowledge distribution as their competence type. It also potentially introduces elements of intrinsic motivation, curiosity about personal performance, and a non-monetary desire to demonstrate knowledge to anonymous others.

The experimental test of the model reveals that an IPE indeed increases effort provision. However, the predicted equilibrium strategy of exerting effort initially and exerting effort again only following failure is only weakly supported in the Abstract context, while agents in the Quiz context adopt the opposite strategy: exert effort particularly when success was achieved in the first period. IPE increases agents' overall effort provision. The endogeneity of the IPE is varied by allowing either the principal or the computer to decide on its implementation. Assuming that agents are curious about their performance and exhibit reciprocal behavior, one would expect lower effort provision if the principal decides against the IPE. However, the data do not support the presence of this reciprocal mechanism.

The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 formalizes the model, and Section 4 characterizes the Perfect Bayesian Equilibria of the game with and without IPE. Section 5 describes the experimental design and develops testable hypotheses. Section 6 presents the experimental results and explores potential explanations for the deviating findings. Section 7 concludes.

2 Related Literature

The project builds on different strands of the literature: the consequences of performance evaluations, multi-period signaling games, and preferences for information.

Interim Performance Evaluation There is a vast and growing theoretical literature on the implementation and design of interim performance evaluations. More broadly, IPEs can be viewed as one particular form of organizational transparency: firms choose how information about employees' actions and outcomes flows within the organization, ranging from visibility to peers and managers to dashboards and formal interim evaluations. These information policies can discipline effort through peer monitoring and social pressure (Mas and Moretti, 2009) or by giving workers direct access to performance analytics that were previously available only to supervisors (Bernstein and Li, 2026). At the same time, greater transparency may backfire if it induces concealment that undermines learning and improvement (Bernstein, 2012), or if disclosure emphasizes easily monitored actions and thereby amplifies conformism driven by career concerns (Prat, 2005). Viewed through this lens, the principal's decision to reveal or conceal interim performance information is a choice of information structure (Kamenica and Gentzkow, 2011), for which credibility and skepticism become central when information is provided strategically (Milgrom and Roberts, 1986). There are two main strands within the theoretical IPE literature. The first strand focuses on subjective, non-verifiable evaluations, while the second, like the current paper, focuses on objective, verifiable information. With subjective IPEs, the honesty and credibility of the feedback provided by the principal become the focus of attention. In this literature, the main message is that bonus wages (e.g. MacLeod, 2003; Fuchs, 2007, 2015; Suvorov and Van de Ven, 2009; Maestri, 2012; Zhang, 2019), the ability to fire agents (Chen, 2015), or costly justification (Lang, 2019) are needed to provide a credible IPE. The other strand of the literature focuses on objective performance evaluations. The papers on objective IPEs differ in the specific assumptions about the game. Chen and Stephen Chiu (2013) assumes that one final good is produced, and the IPE can increase the agent's motivation to exert effort in the second period if performance so far has been good, or decrease it if performance so far has been bad. However, this trade-off cannot occur in situations where two unrelated products are produced. IPEs in competitive environments, such as tournaments, create trade-offs in which agents who learn that they are more likely to be competent exert more effort than others (Ederer, 2010), or in which agents who learn that they are close to winning exert more effort than those who are leading or lagging far behind (Gürtler and Harbring, 2010; Goltsman and Mukherjee, 2011). A related strand of research examines optimal feedback provision in dynamic contests, identifying when concealing rather than disclosing interim performance information generates higher effort (Aoyagi, 2010; Ely et al., 2023). In all of these models, however, effort incentives arise from competition between agents, whereas the current paper studies the choice between concealment and revelation in a single-agent career-concern setting.

In career-concern models with IPE, if effort and talent are substitutes in the production function, a ratchet effect arises in which agents want principals to believe they did not exert effort, as this would increase the principal's belief about the agent's talent (Hansen, 2013). Under a complementary production function instead (as in Dewatripont et al., 1999; Suvorov and Van de Ven, 2009; Di Pei, 2016; Smolin, 2021), effort is crucial for success, and the probability of success increases with talent. Under complementary production functions, this ratchet effect cannot arise.

The assumption in the current paper that the principal is privately, or at least better, informed about the quality of the agent's production is the starting point of almost all studies on IPEs, while the assumption that an agent is better informed about his own ability is common to the signaling literature (see Riley (2001) for an overview of the earlier literature). What appears to be missing from the current literature is the combination of these two assumptions with the possibility that a principal provides objective performance evaluations. By assuming symmetric information about the agent's ability, agents' equilibrium strategies do not differ in the first period of a signaling game. The current paper therefore provides a rationale for observing different effort levels in the first period that does not rely solely on mixed-strategy play.

Performance feedback and effort A large experimental literature studies how performance feedback affects effort provision, with effects that vary across contexts and depend on whether the feedback is favorable or unfavorable. Kuhnen and Tymula (2012) find that the prospect of learning one's rank raises effort, but that agents who learn that they performed better than expected subsequently reduce effort, while those who learn that they performed worse increase it. Field and natural experiments on relative performance feedback document similarly heterogeneous effects (e.g., Azmat and Iriberri, 2010; Azmat et al., 2019; Eriksson et al., 2009); see Villeval (2020) for a survey. Two features distinguish the current paper from this literature. First, most of these studies examine relative performance feedback, where effort responds to one's standing among peers, whereas the current paper studies feedback about an agent's own output in a non-competitive setting. Second, this literature is largely reduced-form, whereas the current paper derives the effort response to feedback from an explicit signaling model, providing a theoretical benchmark against which the experimental results can be assessed. Notably, the reduction in effort after favorable feedback found by Kuhnen and Tymula (2012) parallels the stopping effect predicted by the present model.

Repeated Signaling Career-concerns assumptions have been widely used since the seminal work of Holmström (1999) and Gibbons and Murphy (1992). Because the current paper assumes private information about the agent's talent, its career-concerns model builds on a signaling game (Spence, 1978) in a multiperiod setting. Depending on the players' action spaces, separation of types may or may not be possible. Kaya (2009) studies a repeated version of a signaling game with persistent binary types and observable history. Because off-equilibrium-path beliefs are unrestricted, signaling can occur even after full separation of types. Kaya therefore focuses on the least-cost separating equilibrium, in which the strong type signals just enough in every period, so that the weak type is not willing to mimic it. Such full separation can occur only if the outcome variable is continuous and unbounded. In the current paper, the type variable is continuous while the outcome variable, *Success*, is binary, which implies that perfect separation is not possible. This binary outcome variable represents scenarios in which a principal learns whether a client was satisfied with the agent's work. Additionally, the least-cost separating equilibrium characterized by Kaya (2009) depends on differences in the concavities of the payoff functions across types: when the payoff functions have the same concavity, as in the current model with binary effort choice, a perfectly separating equilibrium cannot occur. Roddie (2012) derives the Riley (1979) separating equilibrium for repeated interactions but requires a positive probability of type change between periods to obtain an equilibrium with signaling efforts in later periods. Heinsalu (2018) also focuses on costly signaling in a multiperiod model in which effort is observed with noise. Because costs are convex in his model, there is a trade-off: agents want to smooth effort over time, but smoothing effort hinders separation possibilities. As in the early work of Holmström (1999), he finds that the more accurate beliefs are, the weaker are the incentives to exert costly effort. Noldeke and Van Damme (1990) develop a repeated version of the Spence (1978) model. They assume that at some point, the payoff from signaling (being hired at a given wage) is realized, and find that if periods are continuous (i.e., the time between periods approaches zero), the solution of their model coincides with the stable outcome of the one-shot game: the Riley (1979) outcome, which is the least-cost separating equilibrium.

Given the model's continuous type distribution, a binary effort choice with fixed costs, and the observation of a binary outcome, a perfectly separating equilibrium cannot exist in the current model. To derive a testable prediction, one must select among multiple equilibria. When excluding the pooling equilibrium in which no type exerts costly effort, the remaining equilibria in the current setup are semi-separating: observing success leads to higher beliefs about the agent's competence, and agents in different competence intervals follow different effort strategies.

Preferences for Information Another relevant strand of literature examines preferences for information and its timing. This literature is predominantly experimental; one exception is Golman and Loewenstein (2018), which provides a theoretical foundation for preferences for non-instrumental information. The experimental findings indicate that agents value receiving information early (Falk and Zimmermann, 2023; Nielsen, 2020; Ganguly and Tasoff, 2017) and that individuals have a strong desire to learn about one's relative position in real effort tasks (Alós-Ferrer et al., 2018). However, whether people react reciprocally by rewarding other players who provide feedback and punishing those who do not remains an open empirical question, with no empirical foundation thus far.[4]

This paper bridges these strands by developing a repeated signaling model of IPE and experimentally testing how agents respond when a principal either provides or withholds information that may be intrinsically valuable to them.

3 The Model

3.1 Setup

A principal (she) and an agent (he) engage in a two-period game. The agent i is privately informed about his competence type $\theta_i \sim \mathcal{U}[0,1]$ and decides for each period t ($t \in \{1,2\}$) whether to exert effort by choosing one of two effort levels $e_t \in \{\varepsilon, 1\}$ where $\varepsilon > 0$.[5] Effort is unobservable to the principal but comes at publicly known cost $c > 0$ for the agent. In each period, the agent produces output that can be of high or low quality. The agent does not observe the quality of the output produced. The probability of *Success* ($S_t \in \{0,1\}$) in producing high-quality output depends on his competence and effort in the respective period:

[4]Reciprocal behavior, however, is well established in other contexts (e.g. Fehr et al., 1997, 2002; Engelmann and Fischbacher, 2009).

[5]The modeling choice of $\varepsilon > 0$ instead of 0 as the lower effort level eliminates the need for assumptions about out-of-equilibrium beliefs, as, given the production function, neither success nor failure is proof of high or low effort provision.

$$Pr(S_t = 1) = 1 - Pr(S_t = 0) = \theta_i \cdot e_t \tag{1}$$

The agent is motivated by career concerns. His utility depends on the posterior belief about his competence type held by the principal (or an external observer) at the end of the game.[6] Incorporating the principal's belief directly into the agent's payoff can be interpreted as a reduced-form representation of the future benefits associated with being perceived as a higher type. Equivalently, the setup can be viewed as a psychological game with belief-dependent utility, following standard approaches in the signaling literature (see Battigalli and Dufwenberg, 2022, for a discussion). The agent's expected utility is given by

$$EU_i(\theta_i, e_1, e_2) = \mathbb{E}\left[\hat{\theta}(S_1, S_2) \mid \theta_i, e_1, e_2\right] - c \cdot \left(\mathbb{1}\{e_1 = 1\} + \mathbb{1}\{e_2 = 1\}\right), \tag{2}$$

where $\hat{\theta}(S_1, S_2) = \mathbb{E}[\theta_i \mid S_1, S_2]$ denotes the posterior belief about the agent's type at the end of the second period. The principal and the observer hold this common belief, since both observe the same outcomes and update by Bayes' rule.

The principal prefers success to failure in each period. Her utility is

$$U_P(S_1, S_2) = F(S_1, S_2),$$

where F is strictly increasing in each argument on $\{0, 1\}^2$.

The observer aims to form accurate beliefs about the agent's competence:

$$U_O(S_1, S_2) = -\left(\hat{\theta}(S_1, S_2) - \theta_i\right)^2, \tag{3}$$

where θ_i denotes the agent's true type, which is unknown to the observer.

At the beginning of the game, the principal commits to one of two publicly observable regimes: interim performance evaluation (*IPE*) or no interim performance evaluation (*NoIPE*). Under *IPE*, the principal truthfully reveals the first-period outcome S_1 to the agent at the end of period 1. Under *NoIPE*, the agent does not observe S_1.

Timeline. The timing is as follows:

[6] In the literature (see, e.g., Visser and Swank, 2007; Levy, 2007; Fehrler and Hughes, 2018; Fehrler and Janas, 2021), this observer may be the principal or a broader market. In line with the career-concern literature, I assume that the observer updates beliefs rationally.

Stage 0 The principal publicly chooses *IPE* or *NoIPE*. The agent privately learns his type $\theta_i \sim U[0,1]$.

Stage 1 The agent privately chooses effort $e_1 \in \{\varepsilon, 1\}$ and generates outcome $S_1 \in \{0,1\}$.

Stage 2 Information revelation:

- **NoIPE:** The agent does not observe S_1.
- **IPE:** The agent observes S_1.

Stage 3 The agent privately chooses effort $e_2 \in \{\varepsilon, 1\}$ and generates outcome $S_2 \in \{0,1\}$.

Stage 4 The principal and the observer observe (S_1, S_2), and the observer forms the posterior belief $\hat{\theta}(S_1, S_2)$.[7]

Stage 5 Payoffs are realized.

4 Equilibrium Predictions

To derive predictions, I characterize the Perfect Bayesian equilibria (PBEs) of the game. For a given strategy profile, beliefs are formed according to Bayes' rule whenever possible, and the agent's strategy is sequentially optimal for each type at every information set. A PBE consists of a strategy profile and a belief system that satisfy sequential rationality and Bayesian consistency.

As is standard in signaling games, the model admits multiple equilibria. When $\varepsilon = 0$, equilibrium selection depends on restrictions on off-path beliefs, since success occurs with zero probability under low effort. By contrast, when $\varepsilon > 0$, both success and failure occur with positive probability under any effort choice, implying that no observation is off the equilibrium path. Consequently, there exists a range of effort costs for which a pooling equilibrium in which all types choose low effort exists alongside equilibria with costly effort provision. In this pooling equilibrium, effort choices do not differ across types, so success is less informative about competence. As a result, posterior beliefs respond less strongly to observed success, which in turn weakens incentives to exert effort. Hence, as $\varepsilon \to 0$, the no-effort strategy profile constitutes an equilibrium for all $c > \frac{1}{6}$, even though equilibria with positive effort provision continue to exist for all $c < \frac{1}{2}$. As ε increases, the range of costs supporting this equilibrium increases until it covers the full range of c as $\varepsilon \to 1$.

[7] Since no further actions are taken after period 2, whether the agent also observes S_2 does not affect equilibrium behavior.

This pooling equilibrium is not useful for comparing the incentive effects of interim performance evaluation. To obtain meaningful predictions, I therefore restrict attention to non-pooling equilibria with active signaling. In particular, following the equilibrium-selection logic of the signaling literature (e.g., Cho and Kreps, 1987; Riley, 1979), I focus on equilibria that maximize signaling activity, that is, equilibria exhibiting the highest effort level for a given cost parameter. Because every outcome occurs with positive probability when $\varepsilon > 0$, refinements that discipline off-path beliefs place no restrictions here, so the selection operates directly on the set of equilibria rather than through belief restrictions.

Subsection 4.1 presents the equilibrium strategies under the *NoIPE* regime, and Subsection 4.2 presents those under the *IPE* regime. Subsection 4.3 compares the resulting predictions under the two regimes regarding expected effort provision and the principal's expected payoff. The equilibrium strategies under *NoIPE* and *IPE* are stated in Propositions 1 and 2, respectively, and the resulting differences in effort provision are summarized in Proposition 3. Appendices A1 and A2 present the derivations of the equilibrium strategies, and Appendix A3 presents further insights into the comparison summarized in Proposition 3.

4.1 Equilibria in the NoIPE regime

As in all signaling games, the opportunity to separate oneself from other types depends on the cost of signaling. Consequently, the equilibrium strategies vary with the cost levels. For very high costs, no type is willing to exert costly effort. For costs close to zero, (almost) every type exerts effort in each period. For low costs, there is an equilibrium in which high types exert effort in both periods, medium types exert effort exactly once, and low types do not exert effort. In this low-cost region, the timing of one-time effort is pinned down by equilibrium requirements. Since high types exert effort in both periods, the outcomes $(S_1, S_2) = (1, 0)$ and $(S_1, S_2) = (0, 1)$ are generated symmetrically by high types, but not necessarily by medium types. If medium types were more likely to exert effort in one period than in the other, the two one-success outcomes would lead to different posterior beliefs, and medium types would strictly prefer one timing of effort. Thus, in the low-cost region, agents who exert effort exactly once randomize with probability 0.5 between first- and second-period effort.

For intermediate cost levels, exerting effort twice is no longer optimal for any type. Low types still exert no effort, while sufficiently high types exert effort exactly once. Without feedback provision, second-period effort cannot depend on the first-period outcome. In the limiting case ($\varepsilon = 0$), the timing of this one-time effort is not pinned down uniquely, because

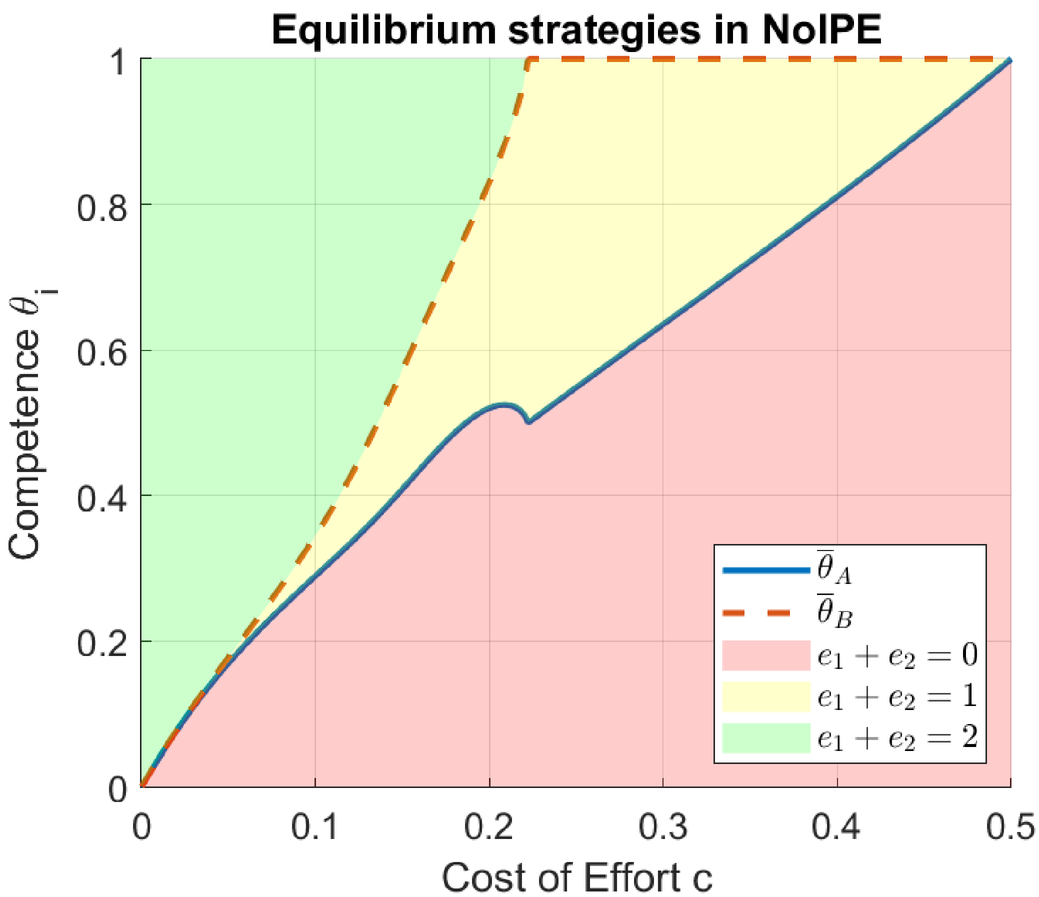


Figure 1: NoIPE: Competence thresholds $\bar{\theta}_A$ and $\bar{\theta}_B$ for $\varepsilon \to 0$ that determine the highest-effort equilibrium strategies.

posterior beliefs after $(S_1, S_2) = (1, 0)$ and $(S_1, S_2) = (0, 1)$ are the same for any common interior mixing probability. However, for any $\varepsilon > 0$, even if arbitrarily small, inactive types can also generate success. This breaks the indifference under asymmetric mixing probabilities: if active types exert effort more often in one period than in the other, the posterior beliefs following the two one-success outcomes are no longer equal. Hence, with $\varepsilon > 0$, the interior mixed equilibrium requires symmetric mixing, while pure timing equilibria also exist in which all active types exert effort only in the first period or only in the second period. In all three cases, the same threshold separates inactive from active types, and all active types exert effort exactly once. Total expected effort is therefore identical across these equilibria, even though the timing of effort differs.

Given thresholds $0 < \bar{\theta}_A(c) \leq \bar{\theta}_B(c) \leq 1$, Proposition 1 summarizes the active-signaling equilibria of the NoIPE regime:

Proposition 1. *The active-signaling PBE strategies under the NoIPE regime, in the limit* *as $\varepsilon \to 0$, depend on c and have the following threshold structure:*

- *For $0 \leq c < \frac{2}{9}$, agents with $\theta_i \leq \bar{\theta}_A(c)$ play $(e_1; e_2) = (0; 0)$, agents with $\bar{\theta}_A(c) < \theta_i \leq \bar{\theta}_B(c)$ play $(e_1; e_2) = (1; 0)$ or $(e_1; e_2) = (0; 1)$ with 50% probability each, and agents with $\bar{\theta}_B(c) < \theta_i$ play $(e_1; e_2) = (1; 1)$.*

- *For $\frac{2}{9} \leq c < \frac{1}{2}$, agents with $\theta_i \leq \bar{\theta}_A(c)$ play $(e_1; e_2) = (0; 0)$, while agents with $\bar{\theta}_A(c) < \theta_i$ exert effort exactly once. There are three timing equilibria: all active agents play $(e_1; e_2) = (1; 0)$, all active agents play $(e_1; e_2) = (0; 1)$, or all active agents mix symmetrically between $(e_1; e_2) = (1; 0)$ and $(e_1; e_2) = (0; 1)$ with probability 50% each. In all three equilibria, the same threshold $\bar{\theta}_A(c)$ separates inactive from active types, so total expected effort is identical.*

- *For $c \geq \frac{1}{2}$, no costly high effort is provided in any period.*

Proof. See Appendix A1. □

Figure 1 illustrates the equilibrium thresholds across the range of c for which some effort is still exerted ($c < \frac{1}{2}$). The green area represents cost-competence combinations for which effort is exerted in both periods. The red area represents combinations for which no effort is exerted. The yellow area represents combinations for which agents exert effort exactly once. In the low-cost region ($c < \frac{2}{9}$), these agents randomize with probability 0.5 between exerting effort only in the first period and exerting effort only in the second period. In the medium-cost region ($\frac{2}{9} < c < \frac{1}{2}$), the yellow area represents the equilibria in which active agents exert effort only in the first period, only in the second period, or mix symmetrically between the two. Appendix A1 presents the derivations of the equilibrium strategies in detail and provides visualizations of the equilibrium belief-updating behavior.

4.2 Equilibria in the IPE regime

The key difference between IPE and NoIPE is that agents under IPE learn the outcome of the first period before deciding on their second-period effort. This information allows agents to condition second-period effort on first-period success. The value of this information is largest for agents who exert effort in the first period, since these agents learn whether their first-period effort has already generated a favorable signal. Agents who do not exert effort in the first period obtain less useful information from the evaluation, because in the limit as $\varepsilon \to 0$, choosing low effort in the first period implies $S_1 = 0$ with probability one.

This possibility of conditioning second-period effort on the first-period outcome changes the equilibrium strategies. Under NoIPE, agents who exert effort exactly once cannot condition the timing of this effort on the first-period outcome. Under IPE, however, a range of

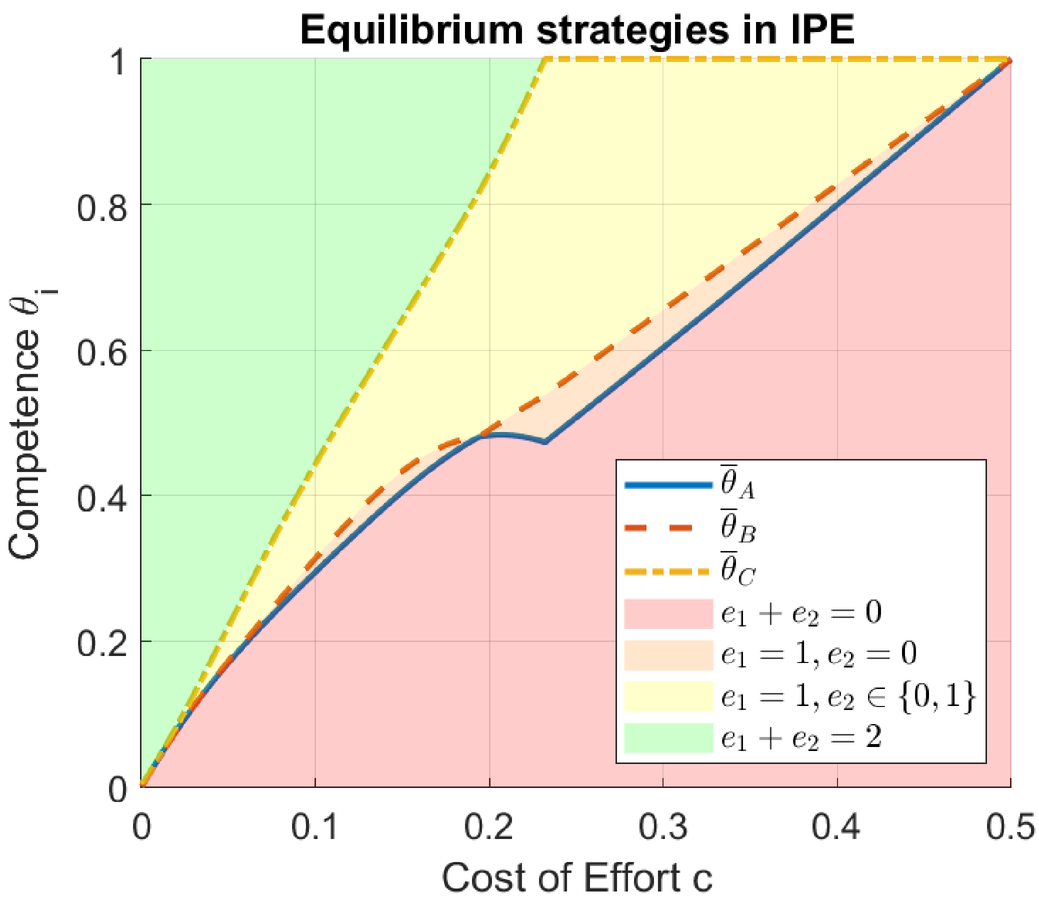


Figure 2: IPE: Competence thresholds $\bar{\theta}_A$, $\bar{\theta}_B$, and $\bar{\theta}_C$ for $\varepsilon \to 0$ that determine the selected active-signaling equilibrium strategies.

types exerts effort in the first period and then exerts effort in the second period only if the first period did not result in success. Hence, after a successful first-period outcome, these agents stop exerting costly effort, whereas after an unsuccessful first-period outcome, they try again to separate themselves from lower types. As $c \to 0$, almost all types exert effort in both periods under both regimes; for high costs, active-signaling equilibria disappear. For intermediate cost levels, however, IPE changes the allocation of effort across periods by making such conditional strategies feasible.

Proposition 2 outlines the selected active-signaling equilibrium strategies when IPE is implemented. Figure 2 visualizes the equilibrium thresholds as a function of c. In Figure 2, the green area represents cost-competence combinations for which agents exert effort in both periods. The red area represents cost-competence combinations for which agents exert no effort. The orange area represents cost-competence combinations for which agents exert effort exactly once: in the low-cost region, these types exert effort only in the second period, while in the medium- and high-cost regions, they exert effort only in the first period. The yellow area represents cost-competence combinations for which agents follow a conditional strategy: they exert effort in the first period and exert effort in the second period only if they do not achieve success in the first period. Appendix A2 provides the derivations of these equilibrium strategies in detail and visualizes the corresponding belief-updating behavior.

Let c_I^L and c_I^H denote the cost thresholds separating the low-, medium-, and high-cost regions under IPE, with

$$0 < c_I^L < c_I^H < \frac{1}{2}.$$

The cutoff c_I^L is defined as the cost at which one-period effort types switch from exerting effort in the second period to exerting it in the first period. The cutoff c_I^H is defined as the cost at which $\bar{\theta}_C(c_I^H) = 1$, so that above this cost no type exerts effort unconditionally in both periods.

Proposition 2. *The selected active-signaling PBE strategies under the IPE regime, in the limit as $\varepsilon \to 0$, depend on c and have the following threshold structure:*

- *For $0 \le c < c_I^L$, agents with $\theta_i \le \bar{\theta}_A(c)$ play $(e_1; e_2) = (0; 0)$; agents with $\bar{\theta}_A(c) < \theta_i \le \bar{\theta}_B(c)$ play $(e_1; e_2) = (0; 1)$; agents with $\bar{\theta}_B(c) < \theta_i \le \bar{\theta}_C(c)$ play $e_1 = 1$ and then choose $e_2 = 0$ if $S_1 = 1$ and $e_2 = 1$ if $S_1 = 0$; agents with $\theta_i > \bar{\theta}_C(c)$ play $(e_1; e_2) = (1; 1)$.*

- *For $c_I^L \le c < c_I^H$, agents with $\theta_i \le \bar{\theta}_A(c)$ play $(e_1; e_2) = (0; 0)$; agents with $\bar{\theta}_A(c) < \theta_i \le \bar{\theta}_B(c)$ play $(e_1; e_2) = (1; 0)$; agents with $\bar{\theta}_B(c) < \theta_i \le \bar{\theta}_C(c)$ play $e_1 = 1$ and then choose $e_2 = 0$ if $S_1 = 1$ and $e_2 = 1$ if $S_1 = 0$; agents with $\theta_i > \bar{\theta}_C(c)$ play $(e_1; e_2) = (1; 1)$.*

- *For $c_I^H \le c < \frac{1}{2}$, agents with $\theta_i \le \bar{\theta}_A(c)$ play $(e_1; e_2) = (0; 0)$; agents with $\bar{\theta}_A(c) < \theta_i \le \bar{\theta}_B(c)$ play $(e_1; e_2) = (1; 0)$; agents with $\theta_i > \bar{\theta}_B(c)$ play $e_1 = 1$ and then choose $e_2 = 0$ if $S_1 = 1$ and $e_2 = 1$ if $S_1 = 0$.*

- *For $c \ge \frac{1}{2}$, no costly high effort is provided in any period.*

Proof. See Appendix A2. □

4.3 Comparison of IPE and NoIPE

Theoretical Result 1: Whether IPE increases or decreases total effort depends on the cost of effort, and the effort ranking reverses at a single cost threshold.

Let $\mathcal{E}^r(c)$ denote expected total high effort under regime $r \in \{\text{NoIPE}, \text{IPE}\}$. Because types are uniformly distributed, expected total effort follows directly from the equilibrium thresholds by integrating each type's effort choice over $[0, 1]$.

Under NoIPE,

$$\mathcal{E}^{NoIPE}(c) = \begin{cases} 2 - \bar{\theta}_A^N(c) - \bar{\theta}_B^N(c), & \text{if } 0 \leq c < \frac{2}{9}, \\ 1 - \bar{\theta}_A^N(c), & \text{if } \frac{2}{9} \leq c < \frac{1}{2}, \\ 0, & \text{if } c \geq \frac{1}{2}. \end{cases}$$

For $c < \frac{2}{9}$, types in $(\bar{\theta}_A^N, \bar{\theta}_B^N)$ exert effort exactly once and types above $\bar{\theta}_B^N$ exert effort in both periods; for $\frac{2}{9} \leq c < \frac{1}{2}$ all active types exert effort exactly once.

Under IPE,

$$\mathcal{E}^{IPE}(c) = \begin{cases} 2 - \bar{\theta}_A^I(c) - \bar{\theta}_B^I(c) - \dfrac{(\bar{\theta}_C^I(c))^2 - (\bar{\theta}_B^I(c))^2}{2}, & \text{if } 0 \leq c < c_I^H, \\ 1 - \bar{\theta}_A^I(c) + \dfrac{\left(1 - \bar{\theta}_B^I(c)\right)^2}{2}, & \text{if } c_I^H \leq c < \frac{1}{2}, \\ 0, & \text{if } c \geq \frac{1}{2}. \end{cases}$$

The first expression applies throughout the low- and medium-cost IPE regimes, $0 \leq c < c_I^H$. Although the equilibrium thresholds solve different systems in the two sub-ranges $0 \leq c < c_I^L$ and $c_I^L \leq c < c_I^H$, the effort accounting is identical: in both, the active population consists of one-effort types in $(\bar{\theta}_A^I, \bar{\theta}_B^I)$, conditional types in $(\bar{\theta}_B^I, \bar{\theta}_C^I)$ who exert expected effort $1+(1-\theta)$, and two-effort types above $\bar{\theta}_C^I$. The second expression corresponds to the high-cost regime, in which $\bar{\theta}_C^I = 1$ and the conditional types span $(\bar{\theta}_B^I, 1)$; it is obtained from the first by setting $\bar{\theta}_C^I = 1$, and its two terms are first-period effort $1 - \bar{\theta}_A^I$ and the conditional second-period contribution $\frac{1}{2}(1 - \bar{\theta}_B^I)^2$.

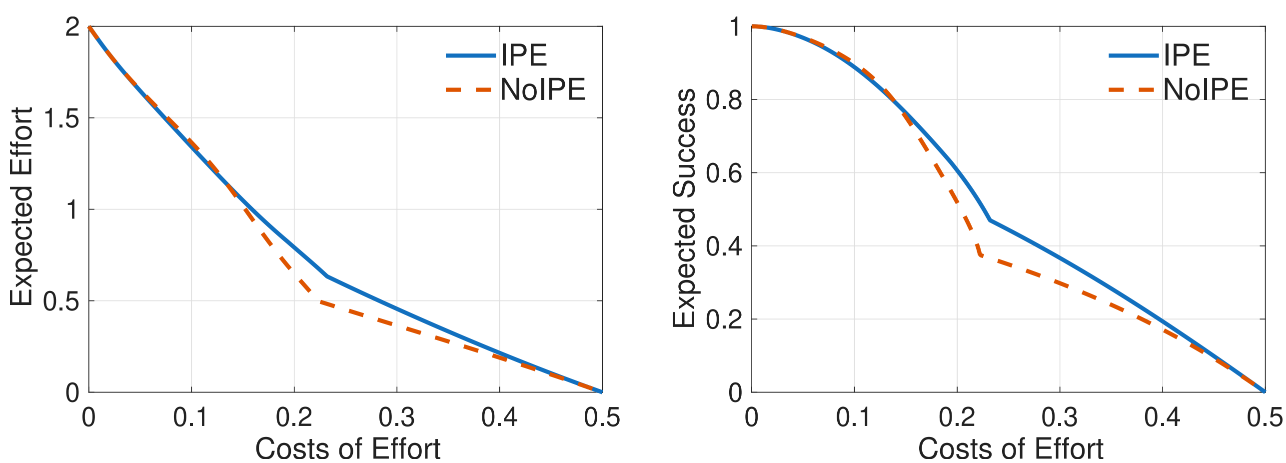
In the NoIPE regime, the medium-cost range admits several timing equilibria. However, all of these equilibria induce the same total effort, since the same threshold separates inactive from active types and all active types exert effort exactly once. The comparison of total effort is therefore independent of which timing equilibrium is selected within this range. The following proposition summarizes the resulting comparison across regimes.

Proposition 3. *Expected total effort is strictly higher under IPE than under NoIPE for all $c \in [c_H^I, \frac{1}{2})$, and equals zero in both regimes for $c \geq \frac{1}{2}$. Numerically solving the equilibrium threshold systems on $(0, c_H^I)$ shows that the expected total effort is strictly higher under NoIPE than under IPE for all costs below a single crossing point $c^* \approx 0.135$, and strictly higher under IPE than under NoIPE above it, so the effort ranking reverses at a single cost threshold.*

Proof. See Appendix A3 for the proof of the analytic statements and the numerical characterization of the crossing. □

Proposition 3 reflects two opposing effects of IPE on total effort. First, IPE lets agents condition second-period effort on first-period performance. This produces a *stopping effect*: an agent who has already generated a favorable signal and thus separated from the low types has weaker incentives to exert costly effort again, so effort falls after an early success. The stopping effect dominates when effort is cheap. Under NoIPE, high types are willing to exert effort in both periods; under IPE, many of these same agents economize on effort once a first-period success has separated them from lower types. As a result, NoIPE induces more total effort for $c < c^*$.

Second, IPE makes first-period effort more attractive through a *conditional-continuation effect*. By exerting effort early, an agent learns whether he has already separated from the lower types, and can still try again in the second period if the first attempt fails. This conditional strategy is most valuable when effort is costly enough that exerting effort unconditionally in both periods is no longer worthwhile. In this range NoIPE induces active agents to exert effort only once, whereas under IPE some agents exert effort in the first period and again only after a failure. This raises total effort under IPE relative to NoIPE for all costs above c^*, up to the point at which active signaling disappears. The two forces exactly balance at $c^* \approx 0.135$, where the effort ranking reverses.



(a) Expected total effort

(b) Expected total success

Figure 3: Comparison of IPE and NoIPE. Panel (a) shows expected total high effort, $\mathcal{E}^r(c)$, under the selected active-signaling equilibrium in each regime. Panel (b) shows expected total success, $E[S_1] + E[S_2]$.

Figure 3 illustrates the comparison. Panel (a) plots expected total high effort $\mathcal{E}^r(c)$ under the selected active-signaling equilibrium in each regime. Consistent with Proposition 3, the two curves cross once: NoIPE lies above IPE for $c < c^*$ and IPE lies above NoIPE for $c^* < c < \frac{1}{2}$, with both vanishing at $c = \frac{1}{2}$. The magnitudes are asymmetric: the NoIPE advantage at low costs is small, so the two curves nearly coincide there, whereas the IPE advantage at higher costs is sizable. The maximal NoIPE advantage is about 0.024 units of expected total effort, attained near $c \approx 0.10$, while the maximal IPE advantage is about 0.18, attained near $c \approx 0.22$.

Panel (b) plots expected total success, $E[S_1] + E[S_2]$. The effort and output comparisons are related but not identical: because higher types are more likely to convert a given effort choice into success, reallocating effort across types affects expected success even when total-effort differences are small. For low costs the two regimes differ little, since both induce substantial effort by high types. For intermediate costs IPE generates higher expected total success, as the conditional strategy directs additional second-period effort toward agents who failed to produce success in the first period. For sufficiently high costs active signaling disappears in both regimes, and both expected effort and expected success converge to zero.

5 Experimental Design and Hypotheses

To test whether IPE can indeed cause higher effort provision, I conduct a laboratory experiment. There are several behavioral factors that could further differentiate the effects of NoIPE and IPE. In this experiment, I focus on two key behavioral influences: intrinsic motivation to signal talent and curiosity about outcomes. If agents are intrinsically motivated to signal their talent, in addition to the extrinsic motivation driven by career concerns, their effort might increase in both periods. However, the model does not provide a clear theoretical prediction about how this would affect beliefs, equilibria, and therefore also the difference between IPE and NoIPE. To test the influence of intrinsic motivation, the experiment includes either an abstract task, in which agent types are randomly assigned, or quiz questions, in which the agent's *competence level* is based on their actual knowledge.

If agents are curious about the results of their effort, they might punish the principal for withholding information by reducing their effort. This assumption is tested by introducing another treatment variation: either the principal or a computer decides between IPE and NoIPE. Theoretical predictions do not differ depending on whether the principal or the computer chooses IPE or NoIPE, as reciprocity concerns are not included in the utility functions. By varying both the nature of the task and the endogeneity of IPE implementation, the experiment also tests the interaction effects between curiosity/reciprocity and intrinsic motivation. This design allows for examining whether, for example, agents who are intrinsically motivated to signal their type are particularly likely to punish the principal for withholding information about their success.

5.1 Experimental Design

The treatments of the experiment vary along two dimensions: 1) whether the decision to implement NoIPE/IPE is made by the principal or by a computer, and 2) whether the task is abstract with randomly assigned types, or a quiz where subjects' competence is determined by correctly answering questions, without any type assignment by the experimenter. The decision-making authority for implementing IPE (whether by the computer or the principal) is varied within-subject. Half of the sessions begin with exogenous implementation by the computer, while the other half start with endogenous implementation by the principal. The context of the task (Abstract/Quiz) is varied between subjects. Principals and agents are randomly matched within their matching groups, and a stranger matching protocol is applied between rounds.

The experiment consists of 10 rounds, each containing two periods. At the start, participants are randomly assigned to the roles of either principal/observer or agent, with half of the subjects in each role.[8] In the Abstract treatments, each agent is privately assigned a random type ($Type \in \{0, 1, 2, ..., 100\}$) at the beginning of each round, with all types being equally likely. This type determines the potential probability of success in each period of the round. In the Quiz treatments, each subject answers 10 questions at the beginning of the experiment. Each question is of the form: "What is the capital of [country]?" with four options: the capital and the three largest other cities other than the capital in that country. The 10 questions are randomly and independently drawn from a sample of 196 countries for each subject, with random positioning of the correct answer. After completing the quiz, each subject privately learns the number of correct answers, which, for the agents, determines their type for the remainder of the experiment. For principals, the quiz serves only to give an impression of the task's complexity.

At the start of each round, an agent is given a budget of 60 points. In each of the two periods, the agent can choose to pay 30 points to attempt to produce a success. If the agent chooses not to pay, success is impossible in that period. In the Abstract treatments, if the agent pays the 30 points, the probability of success equals their type (in percent). In the Quiz treatments, agents also choose whether to pay 30 points and answer a new set of randomly drawn capital questions in each period. Success occurs if the costs have been paid and at least 7 out of 10 questions are answered correctly.

[8] Neutral wording is used throughout the experiment. For details, refer to the Instructions and Decision Screens in Appendices A and B.

The principal serves two roles: they act as the principal for one agent and as an observer for another agent within the same matching group. When acting as the principal, they can choose to implement IPE or not during the endogenous rounds. The principal earns 50 points for each successful outcome achieved by the agent they are matched with. As an observer, the principal must guess the type of another agent based on the observed successes across the two periods. Using the strategy method (Selten, 1967), the observer makes predictions for four scenarios: 1) no success, 2) success in the first period only, 3) success in the second period only, and 4) success in both periods. In the Abstract treatments, these predictions range from 0 to 100; in the Quiz treatments, they range from 0 to 10. Observers are incentivized for accuracy.[9] The agent's round earnings are determined by the observer's guess for the scenario that actually occurred. In the Abstract treatments, the entered number directly translates to the agent's points earned in that round (minus the investment costs), while in the Quiz treatment, the agent's earnings are 10 times the entered number (minus the investment costs).

At the end of each round, the agent learns their round payoff. The principal learns whether success occurred in each period. The observer does not learn the true type of the agent during the game but will be informed of it on the feedback screen at the end of the experiment. If IPE is implemented, the agent learns whether success occurred in both periods. If NoIPE is implemented, the agent learns only whether success occurred in the second period. At the end of the experiment, three [two] rounds are randomly selected to be payoff-relevant for the agent [principal]. For the observer, two rounds are randomly chosen as payoff-relevant. Each point is converted into Euros at the rate of 25 points = 1 Euro, and each subject receives a show-up fee of €3 in the Abstract treatments and €6 in the Quiz treatments.[10] At the end, subjects are asked to complete a short questionnaire about their socio-economic background and provide open-ended responses regarding their behavior in the experiment.

The experiment was programmed with zTree (Fischbacher, 2007) and conducted in two waves due to lab closures related to the Covid-19 pandemic. The first wave took place in the Lakelab at the University of Konstanz in September and October 2020. It comprised seven sessions of the Quiz treatment with 10 subjects each and eight sessions of the Abstract treatment, with six sessions involving 10 subjects and two sessions involving eight subjects. The second wave was conducted at the WiSo lab in Hamburg between May and July 2024,

[9] In the Abstract treatments, the observer's round payoff equals $100 - |\text{true type} - \text{entered guess}|$. In the Quiz treatments, the observer's round payoff equals $100 - 10 \cdot |\text{true type} - \text{entered guess}|$.

[10] The laboratory rule is to pay subjects an expected hourly wage. The higher show-up fee in the Quiz treatments stems from the longer experiment duration, because each agent answers 210 questions.

with matching group sizes ranging from 8 to 14, involving 88 subjects in the Abstract treatment and 88 subjects in the Quiz treatment. In total, 322 subjects in 33 matching groups participated in the experiment. Subjects were recruited via hroot (Bock et al., 2014) from the student subject pools at the Universities of Konstanz and Hamburg. The subjects had an average age of 24.75 years (SD = 4.85), were 44.12% male, and were enrolled in various majors. The Quiz [Abstract] treatments lasted an average of 60 [50] minutes, including the instruction phase and the post-experimental questionnaire. The average payoff in the Quiz [Abstract] treatments was €14.45 (SD = 2.95) [€12.58 (SD = 2.47)].

5.2 Hypotheses

The experimental design allows for testing several hypotheses. Hypotheses 1-3 and 5 are derived from the model. Hypothesis 4 is exploratory and follows from behavioral considerations: the potential intrinsic value of (un)fulfilled curiosity, reciprocity, and the non-monetary utility from signaling competence in the Quiz task. The predictions are based on the implemented effort cost of 30 points, corresponding to the cost level of $c = 0.3$ in the theory section. This cost lies above the crossing point $c^* \approx 0.135$ and above the regime boundary $c_I^H \approx 0.232$, so the one-threshold equilibrium of Proposition 1 and the high-cost conditional-strategy equilibrium of Proposition 2 apply. At this cost the model predicts expected total effort of approximately 0.46 under IPE and 0.36 under NoIPE, and it prescribes the conditional strategy for all types above $\bar{\theta}_B \approx 0.655$, so the implemented cost makes both the directional effort comparison (Hypothesis 2) and the stopping mechanism (Hypothesis 3) testable with sizable predicted differences.

Hypothesis 1: Total effort increases with the competence type.

Hypothesis 2: Under IPE, there is more total effort provision for a given competence type than without IPE.

Hypothesis 3: Under IPE, Period 2 effort is higher after NoSuccess than after Success.

Hypothesis 4: In the endogenous treatments, there is more accumulated effort when the principal chooses to implement IPE than when IPE is imposed exogenously; conversely, there is less accumulated effort when the principal chooses NoIPE than when NoIPE is imposed exogenously. This reciprocity effect is expected to be stronger in the Quiz task than in the Abstract task.

Hypothesis 5: The observer's belief about an agent's competence type increases with the number of Successes.

As the theoretical predictions arise from a specific equilibrium selection criterion, alternative selection criteria might lead to different predictions. For example, at the cost level $c = 0.3$, no one providing effort would be an equilibrium in both regimes. Consequently, it is not clear a priori whether the predicted equilibria will be observed in practice. Additionally, the predicted behavior of principals and agents involves a level of strategic reasoning that may not accurately reflect actual behavior. Prior research also raises questions about whether Bayesian updating accurately describes how people actually update beliefs (e.g., Ouwersloot et al., 1998; Zizzo et al., 2000), which would render a PBE invalid in practice. Finally, while there is clear evidence in the literature supporting the existence of curiosity (e.g., Alós-Ferrer et al., 2018) and reciprocity (e.g., Falk and Fischbacher, 2006), the extent to which these incentives interact as hypothesized remains uncertain. Therefore, it is not obvious that any of the hypotheses will hold in the laboratory setting.

6 Results

This section begins with the findings on effort provision across the different treatments. Section 6.2 then analyzes the observers' evaluation behavior. Section 6.3 discusses the principals' IPE choices, Section 6.4 provides an overview of further results from the Quiz task, and Section 6.5 explores potential reasons for deviations from the theoretical predictions.

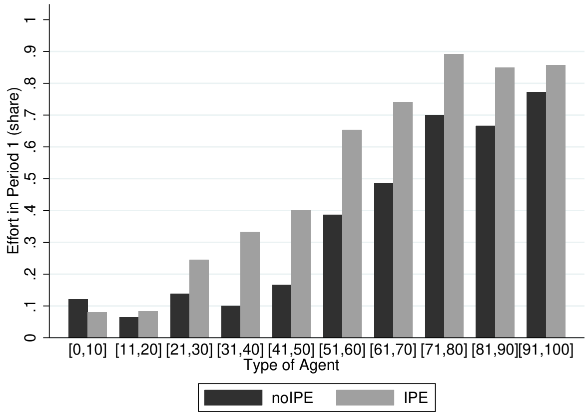
To test for treatment differences, standard errors are clustered at the matching-group level. For comparisons within the Abstract treatments, the paired structure of the data can be taken into account, as agents participate under both IPE and NoIPE regimes, with both endogenous and exogenous implementation, and as different types. Thus, some regressions include subject fixed effects to focus specifically on within-subject differences.

6.1 Effort Provision of the Agents

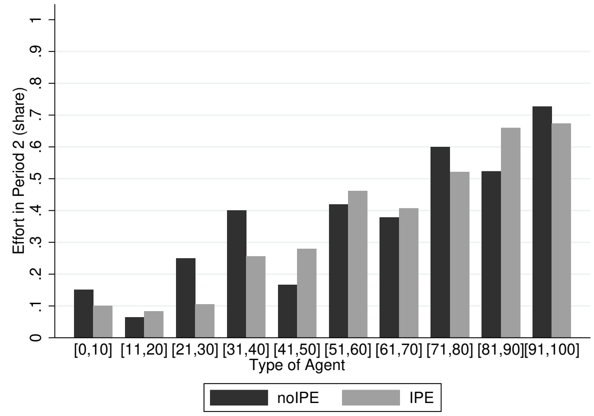
Experimental Result 1 (Effort and Type): *Hypothesis 1 is confirmed: Effort significantly increases with the type of agent.*

Experimental Result 2 (Effort under IPE): *Hypothesis 2 is confirmed: IPE significantly increases overall effort provision.*

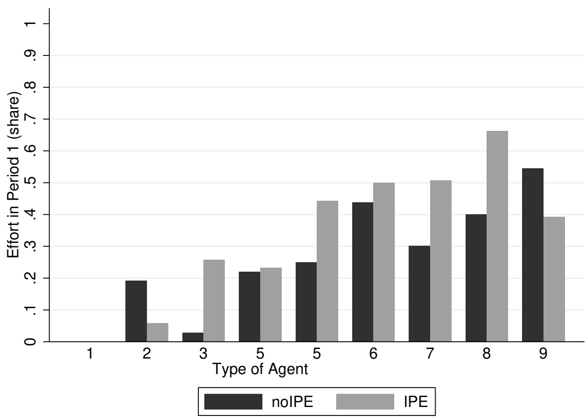
For an initial overview, Figure 4 presents the share of effort provision in the first and second periods within the Quiz and Abstract contexts. In both contexts, exerting effort in a period is defined as paying the cost of 30 points to have a chance of Success. Table 1



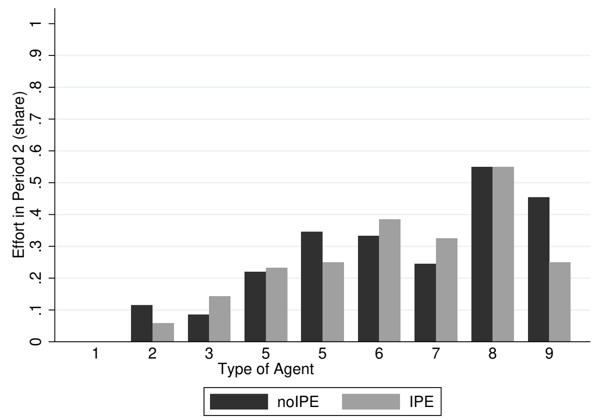
(a) Abstract, Period 1



(b) Abstract, Period 2



(c) Quiz, Period 1



(d) Quiz, Period 2

Figure 4: Effort provision in the first and second period with (IPE) and without (NoIPE) feedback about first period success.

Notes: In the Abstract contexts, type is exogenously given at the beginning of each round. In the Quiz context, type is based on the performance of an agent prior to the first round, and kept throughout the experiment.

provides statistical analysis of the influence of agents' types and IPE on overall effort provision. Tables 2 and 3 provide separate tests for first and second period effort provision. The panels in Figure 4 demonstrate that in both contexts, higher types exert more effort. This holds overall (Table 1), as well as for Period 1 (Table 2) and Period 2 (Table 3) separately, and thus confirms Hypothesis 1. Panels (a) and (c) of Figure 4 further show that, for given types, first-period effort is higher under IPE than under NoIPE. Table 2 confirms that this increase in first period effort through IPE is highly significant. As indicated by the *Round* coefficient, effort tends to decrease over time; however, the significant effect of

Table 1: Total effort provision

	Abstract			Quiz	
	(1)	(2)	(3)	(4)	(5)
Type of Agent	0.016***	0.017***	0.016***	0.123***	0.123***
	(0.001)	(0.001)	(0.001)	(0.037)	(0.037)
IPE	0.144**	0.146***	0.132**	0.117***	0.121***
	(0.054)	(0.044)	(0.056)	(0.037)	(0.035)
Round			-0.045***		-0.061***
			(0.010)		(0.009)
const.	-0.096	-0.636***	0.156*	-0.094	0.239
	(0.086)	(0.075)	(0.084)	(0.178)	(0.180)
Subject FE	No	Yes	No	No	No
Obs.	820	820	820	790	790
Clusters	17	17	17	16	16
R^2	0.326	0.557	0.350	0.109	0.158

Notes: OLS regressions on total effort provision for agents. Columns (1)–(3) report results for the Abstract treatments and columns (4)–(5) for the Quiz treatments. *IPE* denotes rounds in which the agent received interim performance evaluation feedback after the first period. *Type of Agent* $\in [0, 100]$ in the Abstract treatments, and $\in [0, 10]$ in the Quiz treatments. *Round* $\in [1, 10]$ denotes the experimental round. Subject fixed effects are included only in column (2). Standard errors are clustered at the matching-group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

IPE on effort provision remains robust even when controlling for the round in the experiment.

Experimental Result 3 (Second Period Effort): *Hypothesis 3 cannot be confirmed. In the Abstract treatments, receiving positive feedback only weakly decreases effort provision, and in the Quiz treatments, receiving positive feedback increases effort provision.*

For second-period effort, panels (b) and (d) of Figure 4 suggest that in both the Abstract and Quiz contexts, second-period effort does not appear to differ significantly between IPE and NoIPE. Table 3 reports the results of an OLS regression that tests this observation statistically. The regressions in column (1) for the Abstract context and column (7) for the Quiz context show that while the agent's type remains a significant predictor of effort provision in the second period, the influence of IPE is close to zero and statistically insignificant.

To dig deeper into second-period effort, one can differentiate second-period effort by the

Table 2: Period 1 effort provision

	Abstract			Quiz	
	(1)	(2)	(3)	(4)	(5)
Type of Agent	0.010***	0.010***	0.010***	0.067***	0.067***
	(0.001)	(0.001)	(0.001)	(0.019)	(0.019)
IPE	0.153***	0.149***	0.147***	0.117***	0.119***
	(0.029)	(0.025)	(0.031)	(0.035)	(0.029)
Round			-0.024***		-0.036***
			(0.005)		(0.005)
const.	-0.124**	-0.516***	0.008	-0.077	0.121
	(0.044)	(0.044)	(0.046)	(0.093)	(0.096)
Subject FE	No	Yes	No	No	No
Obs.	820	820	820	790	790
Clusters	17	17	17	16	16
R^2	0.331	0.505	0.350	0.098	0.145

Notes: OLS regressions on the choice to pay 30 points to have a chance of success in the first period. Columns (1)–(3) report results for the Abstract treatments and columns (4)–(5) for the Quiz treatments. *IPE* denotes rounds in which the agent received interim performance evaluation feedback after the first period. *Round* $\in [1, 10]$ denotes the experimental round. Subject fixed effects are included only in column (2). Standard errors are clustered at the matching-group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

effort provision and outcome in the first period. The model admits three active-signaling equilibria for this cost range under NoIPE: low type agents do not provide any effort, and higher type agents either mix uniformly between first- or second-period effort, or provide effort in the first or the second period only. In the second period under IPE, however, the model predicts that for a large share of types, if first-period effort led to success, no effort should be provided in the second period. Conversely, if first-period effort did not lead to success, effort should be provided in the second period.

Column (6) of Table 3 shows that this pattern weakly holds for the Abstract treatment. For the Quiz treatment, as shown in column (12), the effect of first-period success is significant but opposite to the prediction: observing first-period success leads to a higher likelihood of second-period effort. Columns (2) to (5) for the Abstract context and (8) to (11) for the Quiz context show that the only case in which IPE is associated with (weakly) significantly less second-period effort is the subsample in which no effort was provided in the first period (and therefore no success could have occurred in the first period). These subsample esti-

Table 3: Period 2 Effort Decision

	All Data	$e_1 = 0$	$e_1 = 1$	$e_1 = 1$, $S_1 = 0$	$e_1 = 1$, $S_1 = 1$	IPE, $e_1 = 1$
Abstract	(1)	(2)	(3)	(4)	(5)	(6)
IPE	-0.009	-0.082**	-0.026	-0.107	0.002	
	(0.033)	(0.036)	(0.053)	(0.084)	(0.054)	
Type of Agent	0.007***	0.003**	0.005**	0.003	0.009***	0.006***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Period 1 Success						-0.142*
						(0.069)
const.	0.028	0.107**	0.285*	0.518***	-0.071	0.268*
	(0.050)	(0.043)	(0.159)	(0.175)	(0.169)	(0.134)
Obs.	820	448	372	116	256	372
Clusters	17	17	17	17	17	17
R^2	0.158	0.056	0.047	0.028	0.098	0.060
Quiz	(7)	(8)	(9)	(10)	(11)	(12)
IPE	0.000	-0.059*	-0.014	-0.071	0.068	
	(0.029)	(0.033)	(0.055)	(0.080)	(0.080)	
Type of Agent	0.056**	0.013	0.079***	0.049	0.091**	0.066**
	(0.019)	(0.014)	(0.027)	(0.039)	(0.035)	(0.026)
Period 1 Success						0.207***
						(0.068)
const.	-0.017	0.115	0.059	0.178	0.025	0.027
	(0.097)	(0.066)	(0.175)	(0.229)	(0.259)	(0.162)
Obs.	790	502	288	142	146	288
Clusters	16	16	16	16	16	16
R^2	0.064	0.013	0.075	0.032	0.099	0.116

Notes: OLS regressions on the choice to pay 30 points to have a chance of success in the second period in the Abstract ((1) - (6)) and the Quiz ((7) - (12)) treatments. *IPE* and *Period 1 Success* are dummy variables. *Type of Agent* $\in [0, 100]$ in the Abstract treatments, and $\in [0, 10]$ in the Quiz treatments. *IPE* denotes the rounds in which the agent received feedback after the first period. Columns (1) and (7) contain all data. Columns (2) and (8) contain only data from rounds in which no effort was provided in the first period. Columns (3) - (5) and (9) - (11) contain only data from rounds in which effort was provided in the first period. Columns (4) and (10) contain only data from rounds in which first period effort did not result in success, and columns (5) and (11) contain only data from rounds in which first period effort resulted in success. Columns (6) and (12) contain only data from rounds with IPE in which effort was provided in the first period. Standard errors are clustered at the matching group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

mates condition on the first-period choice, which is itself affected by IPE (so they compare endogenously selected groups and should not be read as causal effects of feedback). This applies in particular to columns (2) and (8): an agent who exerted no first-period effort knows that no success occurred regardless of the feedback regime, so IPE conveys no information in this subsample, and the negative coefficient is more plausibly a composition effect, as IPE draws marginal types into first-period effort and leaves a more negatively selected group with $e_1 = 0$. Columns (6) and (12), which compare second-period choices across realized first-period outcomes within IPE rounds with first-period effort, provide the most direct test of the conditional-strategy prediction, since the outcome is random conditional on the agent's type, which the regressions control for.

Overall, when combining effort provision across both periods, the regressions in Table 1 show that IPE increases effort provision in both the Abstract and Quiz contexts. This is in line with the model, which predicts increased total effort under IPE at a cost of 0.3 (30 points in the experiment). The empirical results show that this increase is driven by an increase in first period effort while second-period effort does not decrease.

Experimental Result 4 (Effort and Reciprocity): *Hypothesis 4 cannot be confirmed: the endogeneity of the IPE implementation does not influence effort provision in the experiment, neither in the Abstract nor in the Quiz treatments.*

Table 4 investigates the effect of the endogeneity of IPE on effort provision. While Hypothesis 4 predicts that agents would reciprocate by providing more effort if the principal chooses to provide feedback (or less effort if feedback is not provided), this behavior is not evident in the data. There is no significant difference in the effect of IPE when it is implemented by the principal instead of randomly by the computer. Columns (1) and (4) of Table 4 confirm that this lack of effect holds in both the Abstract and Quiz treatments. Columns (2) and (5), as well as (3) and (6), respectively, show that the lack of effect of endogeneity on effort provision holds for both the first and the second period, and in both contexts.

6.2 Observers' Evaluation Behavior

Experimental Result 5 (Observer Behavior): *Hypothesis 5 is confirmed: observing more successes significantly increases the belief about an agent's type.*

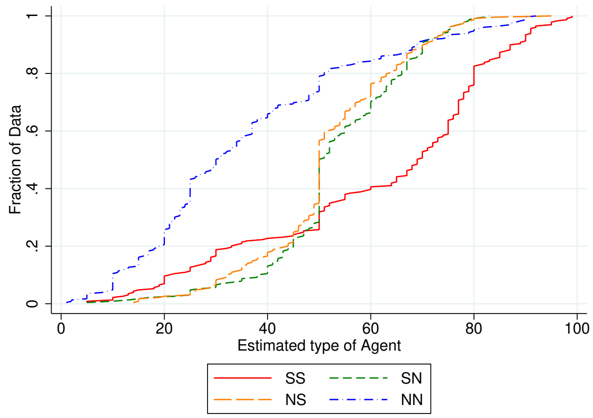
Table 4: Effort provision and endogenous IPE

	Abstract			Quiz		
	Total effort	Period 1	Period 2	Total effort	Period 1	Period 2
	(1)	(2)	(3)	(4)	(5)	(6)
Type of Agent	0.016***	0.010***	0.007***	0.123***	0.067***	0.056**
	(0.001)	(0.001)	(0.001)	(0.037)	(0.019)	(0.019)
Endogenous	-0.002	-0.044	0.041	0.010	-0.020	0.030
	(0.096)	(0.051)	(0.062)	(0.113)	(0.070)	(0.055)
IPE	0.144*	0.118***	0.026	0.101	0.086*	0.015
	(0.068)	(0.031)	(0.051)	(0.069)	(0.045)	(0.045)
Endogenous × IPE	-0.000	0.075	-0.075	0.024	0.059	-0.036
	(0.120)	(0.048)	(0.087)	(0.100)	(0.070)	(0.046)
const.	-0.096	-0.111**	0.015	-0.098	-0.071	-0.027
	(0.095)	(0.050)	(0.052)	(0.169)	(0.088)	(0.092)
Obs.	820	820	820	790	790	790
Clusters	17	17	17	16	16	16
R^2	0.326	0.332	0.160	0.110	0.099	0.065

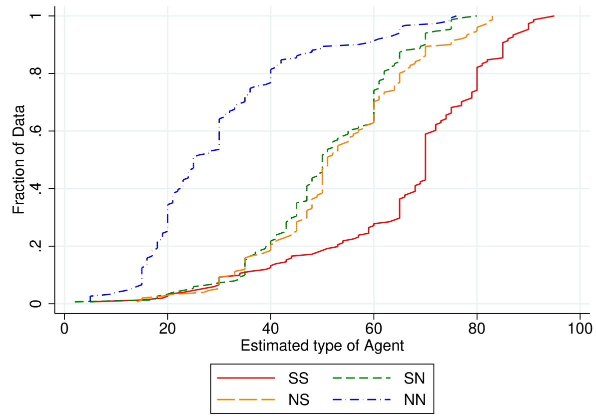
Notes: OLS regressions for effort provision. Columns (1)–(3) report results for the Abstract treatments and columns (4)–(6) for the Quiz treatments. The dependent variables are total effort, period 1 effort, and period 2 effort, respectively. *IPE* denotes rounds in which the agent received interim performance evaluation feedback after the first period. *Endogenous* is a dummy variable indicating rounds in which the implementation of IPE was decided by the principal rather than assigned by the computer. Standard errors are clustered at the matching-group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

For signaling incentives to be present, observers must form higher beliefs about an agent's type after observing success than after observing no success. Figure 5 displays the cumulative distribution function of the observers' beliefs about an agent's type. The observer was informed whether the agent received feedback after the first period (IPE) or not (NoIPE). The graphs demonstrate that signaling incentives to provide effort are indeed present in the experiment: observing success significantly increases the beliefs reported by observers. The difference in beliefs between observing success twice and observing it only once is significant in both the Quiz ($p < 0.05$) and Abstract ($p < 0.001$) treatments.[11] Similarly, the difference in beliefs between observing no success and observing one success is also significant for both the Quiz ($p < 0.01$) and Abstract ($p < 0.001$) treatments. However, the difference in beliefs between success in the first period only and success in the second period only is not

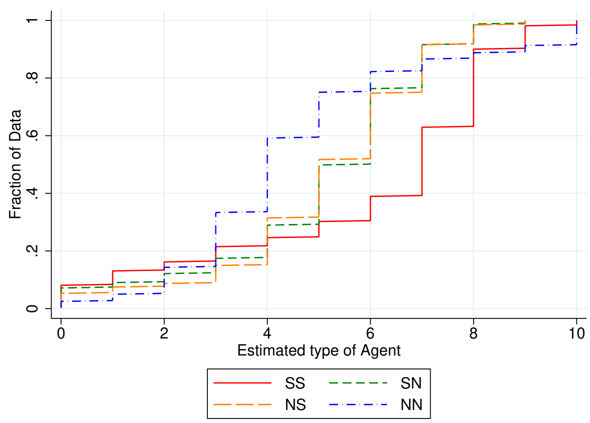
[11]The results stem from t-tests clustered at the principal level.



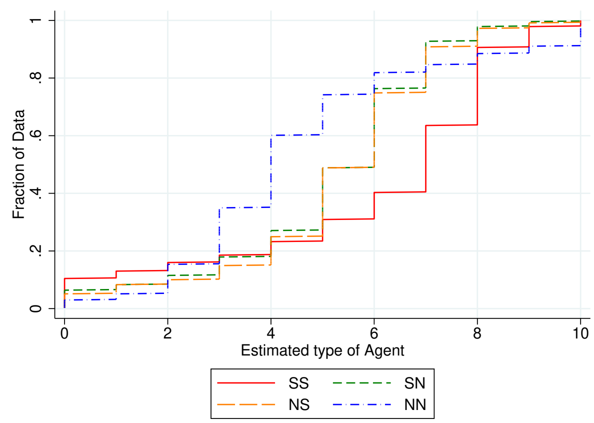
(a) Abstract, NoIPE



(b) Abstract, IPE



(c) Quiz, NoIPE



(d) Quiz, IPE

Figure 5: CDF of Observers' Evaluations

Notes: (SS),(SN),(NS),(NN) correspond to the beliefs about an agent who had (Success, Success), (Success, No Success), (No Success, Success), and (No Success, No Success), respectively. This evaluation was conducted via the strategy method, without feedback between the experimental rounds.

significant: this holds true in both the Abstract and Quiz treatments, regardless of whether IPE or NoIPE was played ($p > 0.1$).

Table 5 presents OLS regressions analyzing treatment differences in observers' average behavior. The results indicate that observers do not significantly adjust their assessments based on the endogeneity of the IPE. This updating behavior aligns with the finding in the previous section, where it was shown that agents also did not behave differently in exogenous versus endogenous rounds. The regressions in Table 5 also reveal that observers do not seem to base their beliefs on whether IPE was implemented. At the effort cost used

Table 5: Observers' Beliefs about Agent's Type

	Abstract				Quiz			
	SS	SN	NS	NN	SS	SN	NS	NN
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IPE	1.310	-0.995	1.834	-4.665	0.113	0.099	0.221	-0.034
	(4.385)	(2.915)	(3.093)	(3.892)	(0.252)	(0.217)	(0.226)	(0.226)
endogenous	-1.485	-0.903	-1.076	-0.792	0.233	-0.004	0.089	0.070
	(1.800)	(1.338)	(1.485)	(1.864)	(0.326)	(0.306)	(0.259)	(0.308)
endogenous	3.860	2.419	0.896	-0.433	-0.291	-0.086	-0.234	0.023
$\times IPE$	(3.046)	(1.958)	(3.108)	(3.459)	(0.446)	(0.359)	(0.320)	(0.421)
const.	63.158***	50.963***	51.279***	35.552***	5.877***	5.089***	5.123***	4.591***
	(2.465)	(1.403)	(1.476)	(2.016)	(0.292)	(0.229)	(0.228)	(0.255)
Obs.	820	820	820	820	790	790	790	790
Clusters	82	82	82	82	79	79	79	79
R^2	0.004	0.001	0.003	0.008	0.001	0.000	0.002	0.000

Notes: OLS regressions of the observers' beliefs for the different possible success occurrences. *IPE* denotes the rounds where the observed agent received feedback after the first period. *endogenous* denotes the rounds where another principal (instead of the computer) chose whether IPE is played. Standard-errors are clustered at the principal level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

in the experiment, the equilibrium posteriors for a given outcome differ across regimes by at most about five points on the experimental scale, so the absence of a significant regime effect on beliefs is not sharply at odds with the theory. The sharpest belief prediction is instead within the IPE regime: the conditional strategy makes a first-period success more informative than a second-period success, with limiting posteriors of approximately 0.82 after (Success, NoSuccess) and 0.78 after (NoSuccess, Success). The data do not show this asymmetry, as beliefs after the two one-success outcomes do not differ significantly under IPE. Under NoIPE, the ranking of the two one-success posteriors depends on which timing equilibrium is selected (higher after a first-period success in the period-1 equilibrium, equal under mixing, and lower in the period-2 equilibrium), so the absence of a difference there is consistent with the symmetric mixing equilibrium.

6.3 Principals' IPE Choices

In half of the rounds, principals had the option to decide whether the agent they were matched with received feedback about their first-period performance. Principals chose to provide feedback in 72.44% of the cases in the Abstract task and 70.13% in the Quiz task. Table 1 presents regressions of total effort on IPE. The results reveal that IPE significantly increases total effort provision. Since, for a given type, the probability of success rises with effort, and types are balanced across regimes by design, higher effort translates into a higher expected number of successes, which determine the principal's round payoff.[12]

In the post-experimental questionnaire, principals were asked the open-ended question: *"What motivated your decision on whether Player A receives feedback about the success in period 1?"* Responding to this question was voluntary and unincentivized, so definitive conclusions cannot be drawn from the responses. However, the answers might still offer valuable insights into the principals' motivations. Table B4 in Appendix B provides a detailed list of the responses. Notable categories include the desire to be kind to the agent, random decision-making, and the statement of mechanisms for why IPE does (or does not) lead to greater success. Most responses fall into the last category, proposing mechanisms such as reciprocity, changes in the agents' risk attitudes, and increased motivation when positive results are known. In the Quiz treatments, the last mechanism is indeed supported by the agents' behavior, as shown in Table 3.

6.4 Knowledge in the Quiz Task

To be a suitable task for the given research question, the Quiz task must meet the following criteria: i) The knowledge tested by the questions during the game should correlate with the participants' initial knowledge (which determines the type that observers estimate); ii) Knowledge should remain relatively stable throughout the experiment; iii) Knowledge should not be influenced by the presence or absence of IPE; and iv) The task should effectively differentiate between participants' knowledge levels, while being easy enough for participants to answer some questions, yet challenging enough to avoid a ceiling effect. The following analyses confirm that all four criteria are met.[13]

Table B1 in Appendix B presents a regression of the number of correct answers given at the beginning of the game (which determines the agent's type) on the number of correct answers provided during the game. The strong and significant correlation between the agent's type and correct answers across both periods confirms that criterion (i) is fulfilled. The insignificance of the round coefficient indicates that criterion (ii) is also met. The *IPE* coefficient is weakly significant for the number of correct answers in period 2 and insignificant for period 1, suggesting that while criterion (iii) is not perfectly satisfied, it is arguably met to a sufficient extent.

Figure B1 in Appendix B plots the number of correct answers throughout the game. The

[12] The payoff was either 0, 50, or 100 points, depending on whether success was realized zero, one, or two times in a round.

[13] It is important to note that, by experimental design, participants were required to answer the questions regardless of whether IPE was implemented or whether the cost was paid.

graph demonstrates that criterion (iv) is also largely fulfilled, as there is no evident floor or ceiling effect. The cutoff of 7 out of 10 correct answers for success appears to be reasonably set, with 36.71% of instances reaching or exceeding this threshold.

6.5 Potential Reasons for Deviations from Hypothesized Behavior

The PBE analysis predicts that for the cost level in the experiment, overall effort should be higher with IPE than without. As shown above, the data is in line with that prediction. However, under IPE, lower second-period effort is anticipated from agents who, after learning of their first-period success, no longer need to exert effort to distinguish themselves from lower types. As shown in Table 3, this effect is only weakly significant in the Abstract task, and reversed in the Quiz task. In the Abstract task, potential reasons for this deviation could include a lack of understanding of the incentives or social preferences toward the principal. Data from the post-experimental questionnaire can be used to explore these possibilities.[14] High school math grades, used as a proxy for cognitive ability, can provide insight into participants' understanding of the experimental instructions and incentives.

In addition to reporting their math grades, participants responded to a 7-point Likert scale question: *"How much emphasis did you place on the payoffs of the other players in your decision-making?"* Table B2 in Appendix B regresses second-period effort for participants who learned of their first-period success on their questionnaire responses, with *Fairness* representing their answers to the fairness question. The analysis reveals that math grades do not significantly correlate with effort provision, suggesting that a lack of understanding of the incentives is unlikely to explain the deviation. However, for the Abstract treatments, responses to the fairness question significantly correlate with second-period effort provision after first-period success, indicating that social preferences may explain the deviation from theoretical predictions. In the Quiz treatments, where intrinsic motivation to succeed is likely higher, no such correlation is observed. Neither gender nor the endogeneity of IPE significantly correlates with second-period effort provision after first-period success. For the Quiz treatments, Table 3 reveals significantly higher second-period effort after communicated first-period success. As fairness does not seem to drive these observations (Table B2), a natural candidate is the nature of the private information in this task. In the Quiz task, an agent's type is his own quiz performance, which he knows only imperfectly, whereas the model assumes that the agent knows his type exactly. A communicated first-period success is then an informative signal about the agent's own ability, so an agent who updates upward also raises his assessment of the return to second-period effort, and a failure has the

[14] As the questionnaire was unincentivized and self-reported, these findings should be interpreted cautiously.

opposite effect. This channel, which the model excludes by assumption, generates exactly the observed positive response to early success and is consistent with the interpretation that communicated success increases confidence in one's ability to succeed again.

6.5.1 Best Reply Behavior

The game is interactive, and while the theoretical model assumes that the evaluating observer engages in Bayesian updating, it remains uncertain whether actual observer behavior aligns with the incentive structures predicted by theory. According to the theoretical predictions in Propositions 1 and 2, the following behavior is expected in the Abstract treatments with a cost level of 30 points: Without IPE, the equilibrium threshold at this cost is $\bar{\theta}_A \approx 0.636$, so agents with a type of 63 or lower should refrain from exerting effort in either period, and agents with a type of 64 or higher should exert effort exactly once. No agent is predicted to benefit from exerting effort in both periods.

Abstract Treatment Given observers' empirical beliefs, exerting no effort yields an average payoff of 35.17 points. Exerting effort only in the first period yields an expected payoff of $\theta_i \cdot 50.53 + (1-\theta_i) \cdot 35.17 - 30$ points, while exerting effort only in the second period results in an expected payoff of $\theta_i \cdot 50.76 + (1-\theta_i) \cdot 35.17 - 30$ points. Exerting effort in both periods yields an expected payoff of $\theta_i^2 \cdot 62.45 + \theta_i \cdot (1-\theta_i) \cdot 50.53 + (1-\theta_i) \cdot \theta_i \cdot 50.76 + (1-\theta_i)^2 \cdot 35.17 - 60$ points. These calculations reveal that, regardless of the agent's type, not exerting effort is the empirical best response.

With IPE, the equilibrium thresholds of Proposition 2 at this cost are $\bar{\theta}_A \approx 0.604$ and $\bar{\theta}_B \approx 0.655$: agents with a type of 60 or lower should not exert effort, agents with a type between 61 and 65 should exert effort only in the first period, and agents with a type of 66 or higher are predicted to use the conditional strategy of exerting effort in the first period and exerting effort in the second period only if the first period did not result in success. However, based on the observer's empirical beliefs (30.17 points for (No Success, No Success), 50.86 points for (Success, No Success), 53.01 points for (No Success, Success), and 65.87 points for (Success, Success)), the best empirical reaction remains to not exert effort, regardless of the agent's type.

Using the actual choice data of the agents, one can determine what the observers' *correct* beliefs should be in the Abstract treatments. In the NoIPE rounds, no success in either period was associated with agents having an average type of 37.58. Success in the first period only came from agents with an average type of 70.41, while success in the second period only was associated with an average type of 61.21. Success in both periods resulted from agents with an average type of 82.21. In the IPE rounds, no success came from agents with an average type of 34.45, success in the first period only from agents with an average type of 68.22, success in the second period only from agents with an average type of 61.65, and success in both periods from agents with an average type of 82.39.

Comparing these actual averages with the observed beliefs reveals that observers were generally too pessimistic. While their estimates were relatively accurate after observing no success in either period, the true types of agents who achieved success in one or both periods were, on average, higher than the observers' beliefs reflected. Consequently, due to these low beliefs after success, the true incentives to exert effort in the experiment were lower than theory would predict.

Quiz Treatment In the Quiz treatments, without IPE, observers' beliefs were 4.62 (NN), 5.09 (SN), 5.15 (NS), and 5.96 (SS). With IPE, the average beliefs were 4.61 (NN), 5.13 (SN), 5.26 (NS), and 5.96 (SS). Given that exerting effort costs 30 points and an increase in beliefs by one unit results in a 10-point payoff increase, these belief differences were also insufficient to make exerting effort the best response.

The *correct* beliefs, based on actual behavior, would have been: without IPE, 5.10 (NN), 6.53 (SN), 6.36 (NS), and 7.71 (SS); with IPE, 5.30 (NN), 6.19 (SN), 6.42 (NS), and 7.23 (SS). Even in the Quiz treatments, it is evident that the observers' beliefs were overly pessimistic compared to the correct beliefs derived from actual agent behavior.

6.5.2 Behavior over Time and Learning

The experiment consists of 10 rounds. At the end of each round, the principal learns how often success occurred, while the agent receives information about the first-period success (in IPE rounds), second-period success, and the observers' belief about the agent's type. The observer, however, does not receive feedback about the accuracy of their beliefs until the end of the experiment.

Observer Table B3 in Appendix B shows that, over time, observers adjust their estimations (weakly) significantly only after observing two instances of success in the Abstract treatment. This gradual increase could be attributed to observers encountering two successes less frequently than expected, based on their prior experiences as principals.

Agent To examine how agents' effort provision changes over time, Figures B2 and B3 in Appendix B show the first- and second-period effort provision for the Abstract (Panels a) and Quiz (Panels b) treatments over the course of the experiment. These figures reveal several trends: In the Quiz treatment, agents' willingness to pay 30 points declines over time. One intuitive explanation is that agents learn that the observers' beliefs are not differentiated enough to justify the 30-point cost. Additionally, agents may realize that the quiz questions are more difficult than initially expected, taking time to recognize the limits of their knowledge of countries' capitals. The figures also show that the difference in first-period effort between NoIPE and IPE in the Quiz treatments emerges in the middle and late stages of the experiment. While effort levels are similar in the first three rounds, the decline in first-period effort without IPE is sharper than with IPE.

For the Abstract treatments, the time trends also vary with the regime. In rounds with IPE, a clear downward slope in effort provision is observed. Without IPE, the effort pattern remains relatively stable but at a lower level.

7 Discussion and Conclusion

Investigating interim performance evaluations under a career-concern framework reveals a key theoretical result: whether IPE increases or decreases total effort provision depends on the cost of effort, with a unique threshold at which the two regimes' total-effort curves cross. At the effort cost implemented in the experiment, the model predicts that IPE strictly increases total effort provision. This prediction is confirmed by the data: both first-period and total effort provision are significantly higher under IPE. The main deviation from the model's prediction concerns the mechanism rather than the direction: the model predicts that agents who succeed early reduce effort provision in the second period, but this decline is at most weakly present in the Abstract task and reversed in the Quiz task. IPE therefore improves performance to a greater extent than the model predicts. This pattern holds across two different settings, one with low and one with high intrinsic motivation, and regardless of whether the IPE is implemented exogenously or chosen by the principal. Testing whether these results extend to field settings is left for future research.

A second empirical lesson concerns the calibration of observers' beliefs. Comparing observers' stated beliefs with the posteriors implied by agents' actual choices shows that observers were systematically too pessimistic following success, so that the reputational reward for a good outcome fell short of its Bayesian benchmark. Given the beliefs agents actually faced, withholding effort was in fact the monetary best response across the entire type range.

That agents nonetheless exerted substantial effort points to motives beyond the monetary return, such as intrinsic satisfaction from signaling competence, image concerns toward the observer and principal, overconfidence about one's ability in the Quiz task, or slow convergence toward the best response, consistent with the decline of effort over rounds shown in Figures B2 and B3. These forces sustain effort even when the pecuniary return to signaling is thin. For organizations, this cuts two ways: signaling incentives can operate even when evaluators reward success only weakly, but managers who presume well-calibrated reputational rewards may overstate the monetary force of their scheme.

More broadly, the results carry a practical message for any organization that controls the flow of performance information to its members. Implementing an interim evaluation is essentially costless to the principal, yet in the experiment it raised effort and, through the resulting successes, the principal's expected payoff. The natural concern that revealing early success leads high performers to coast (the stopping behavior that the equilibrium prescribes for high types at the implemented cost, and the source of the predicted effort loss at low costs) does not appear as a decline in either task context; in the knowledge-based task, early success in fact raised subsequent effort. Managers who hesitate to share positive interim feedback for fear of dampening motivation thus find little support for that fear in these data, at least in the cost region studied here.

The findings can also apply to other settings. Consider a professor hiring a new PhD student and aiming to maximize research output. In addition to well-known effects—such as identifying students who may not thrive in academia, providing guidance before final projects, and incurring time costs for evaluations—this paper introduces a new factor. If PhD students are better informed about their own ability or opportunity costs than their supervisor, the supervisor can better assess the quality of research output, and students value their supervisor's belief in their competence and career prospects, then an interim evaluation is predicted to increase effort provision. Concerns that withholding information reduces effort through reciprocal behavior are not supported by the data.

Several limitations qualify these conclusions. The experiment implements a single effort cost, $c = 0.3$, which lies above the threshold c^* at which the effort ranking reverses; the data therefore speak to the region in which the model predicts IPE to dominate, but not to the low-cost region in which NoIPE is predicted to elicit more total effort. Testing the crossing itself, and locating c^* empirically, would require varying the cost of effort across treatments. The model also abstracts from richer features of real evaluation environments: effort is binary, the horizon is two periods, and evaluations are objective and truthful by construction. As is standard in laboratory work, the subject pool consists of students, so external validity to workplace settings remains to be established. Finally, the absence of the stopping effect, and its reversal in the Quiz task, indicates that the response to feedback is sensitive to the nature of agents' private information—a margin the present design varies only coarsely.

These limitations suggest several directions for future work. Varying the effort cost across treatments would allow the two effort curves to be traced out and the predicted reversal at c^* to be tested directly, a sharper test of the theory than a single cost level permits. Extending the design to subjective or potentially misreported evaluations would link the present objective-feedback setting to the large literature on subjective performance evaluation. And because agents respond to feedback even when evaluators' rewards are weakly calibrated, manipulating the evaluators' own information or incentives—for example, by giving observers feedback on the accuracy of their past beliefs—could help separate the strategic component of the effort response from the intrinsic one.

A final direction concerns the time horizon. While the current model is easily applied to limited-time contracts in which employees may later seek a reference from their former principal, the implications for longer-term employment with recurring IPEs are less clear. The conditional-strategy logic suggests that, under recurring IPEs, agents would exert effort until their record is sufficiently convincing and stop thereafter. However, the point at which this occurs—how many successes are needed before the reputational benefit of further effort no longer justifies the cost—depends on both effort costs and the agent's type, making the multi-period case richer than a straightforward extension of the two-period model. Formally characterizing equilibria with recurring IPEs and testing the resulting predictions experimentally would be a particularly valuable next step.

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A Theoretical Appendix

A1 NoIPE: derivation of Proposition 1

Throughout this appendix, I characterize equilibria in the limiting case $\varepsilon \to 0$. For expositional simplicity, I write $(e_1, e_2) = (0, 0)$ for the limiting low-effort strategy. Formally, this corresponds to choosing $(e_1, e_2) = (\varepsilon, \varepsilon)$ and then taking the limit as $\varepsilon \to 0$.

The purpose of this appendix is twofold. First, I discuss the pooling low-effort equilibrium, which exists for a wide range of costs and motivates the equilibrium-selection criterion used in the main text. Second, I characterize the selected active-signaling equilibrium stated in Proposition 1.

Pooling low-effort equilibrium. Suppose that all types choose low effort in both periods, $(e_1, e_2) = (\varepsilon, \varepsilon)$. Since $\varepsilon > 0$, success can occur even when no type chooses high effort. Hence, no outcome is off path, and the principal's posterior beliefs are pinned down by Bayes' rule. Under the pooling low-effort strategy, these posterior beliefs are

$$\mu_{00} = E[\theta_i \mid S_1 = 0, S_2 = 0] = \frac{\frac{1}{2} - \frac{2\varepsilon}{3} + \frac{\varepsilon^2}{4}}{1 - \varepsilon + \frac{\varepsilon^2}{3}},$$

$$\mu_{10} = \mu_{01} = E[\theta_i \mid S_1 = 1, S_2 = 0] = E[\theta_i \mid S_1 = 0, S_2 = 1] = \frac{\frac{1}{3} - \frac{\varepsilon}{4}}{\frac{1}{2} - \frac{\varepsilon}{3}},$$

and

$$\mu_{11} = E[\theta_i \mid S_1 = 1, S_2 = 1] = \frac{3}{4}.$$

Given these beliefs, a deviation from low effort to high effort in one period changes the probability of success in that period from $\varepsilon\theta_i$ to θ_i. The gross gain from such a one-period deviation is

$$G_1(\theta_i; \varepsilon) = (1 - \varepsilon)\theta_i \left[(1 - \varepsilon\theta_i)(\mu_{10} - \mu_{00}) + \varepsilon\theta_i(\mu_{11} - \mu_{01})\right].$$

Similarly, the gross gain from deviating to high effort in both periods is

$$\begin{aligned} G_2(\theta_i; \varepsilon) = {} & \theta_i^2\mu_{11} + \theta_i(1 - \theta_i)\mu_{10} + (1 - \theta_i)\theta_i\mu_{01} + (1 - \theta_i)^2\mu_{00} \\ & - \left[(\varepsilon\theta_i)^2\mu_{11} + 2\varepsilon\theta_i(1 - \varepsilon\theta_i)\mu_{10} + (1 - \varepsilon\theta_i)^2\mu_{00}\right]. \end{aligned}$$

Therefore, the pooling low-effort strategy is a PBE if

$$c \geq \max_{\theta_i \in [0,1]} G_1(\theta_i; \varepsilon)$$

and

$$2c \geq \max_{\theta_i \in [0,1]} G_2(\theta_i; \varepsilon).$$

Equivalently, defining

$$\bar{c}^{pool}(\varepsilon) \equiv \max \left\{ \max_{\theta_i \in [0,1]} G_1(\theta_i; \varepsilon), \frac{1}{2} \max_{\theta_i \in [0,1]} G_2(\theta_i; \varepsilon) \right\},$$

the pooling low-effort equilibrium exists for all

$$c \geq \bar{c}^{pool}(\varepsilon).$$

Taking the limit as $\varepsilon \to 0$, the posterior beliefs converge to

$$\mu_{00} \to \frac{1}{2}, \qquad \mu_{10} = \mu_{01} \to \frac{2}{3}, \qquad \mu_{11} \to \frac{3}{4}.$$

In this limit, the largest one-period deviation gain is

$$\max_{\theta_i \in [0,1]} \theta_i \left(\frac{2}{3} - \frac{1}{2} \right) = \frac{1}{6},$$

while the largest two-period deviation gain per unit of effort cost is

$$\frac{1}{2} \max_{\theta_i \in [0,1]} \left[\theta_i^2 \frac{3}{4} + 2\theta_i (1 - \theta_i) \frac{2}{3} + (1 - \theta_i)^2 \frac{1}{2} - \frac{1}{2} \right] = \frac{1}{8}.$$

Hence,

$$\bar{c}^{pool}(\varepsilon) \to \frac{1}{6} \qquad \text{as } \varepsilon \to 0.$$

Thus, for sufficiently small $\varepsilon > 0$, the pooling low-effort equilibrium exists for all costs above a threshold close to $\frac{1}{6}$.

This pooling equilibrium is not the equilibrium characterized in Proposition 1. In the main text, I select the active-signaling equilibrium whenever such an equilibrium exists. The remainder of this section derives this selected equilibrium.

Proof of Proposition 1. Let

$$\mu_{ab} \equiv E[\theta_i \mid S_1 = a, S_2 = b]$$

denote the principal's posterior belief after observing outcome $(S_1, S_2) = (a, b)$. Under NoIPE, the agent does not observe S_1 before choosing second-period effort. Thus, in the limiting game, a type θ_i can choose one of the following relevant strategies:

$$(0,0), \qquad (1,0), \qquad (0,1), \qquad (1,1).$$

Given posterior beliefs $(\mu_{00}, \mu_{10}, \mu_{01}, \mu_{11})$, the corresponding expected utilities are

$$U_0(\theta_i) = \mu_{00}, \tag{A.1}$$

$$U_1(\theta_i) = \theta_i \mu_{10} + (1-\theta_i)\mu_{00} - c, \tag{A.2}$$

$$U_2(\theta_i) = \theta_i \mu_{01} + (1-\theta_i)\mu_{00} - c, \tag{A.3}$$

$$U_{12}(\theta_i) = \theta_i^2 \mu_{11} + \theta_i(1-\theta_i)\mu_{10} + (1-\theta_i)\theta_i\mu_{01} + (1-\theta_i)^2\mu_{00} - 2c. \tag{A.4}$$

The proof proceeds by considering the relevant active-signaling cost regions.

Upper bound for active-signaling equilibria. Consider a one-threshold active-signaling equilibrium in which types $\theta_i \le \bar{\theta}_A$ choose no high effort, while types $\theta_i > \bar{\theta}_A$ exert high effort exactly once. The posterior beliefs after no success and after one success are

$$\mu_{00} = \frac{2}{3}\left(\frac{\frac{1}{2} + \bar{\theta}_A^3}{1+\bar{\theta}_A^2}\right), \qquad \mu_{10} = \mu_{01} = \frac{2}{3}\left(\frac{1-\bar{\theta}_A^3}{1-\bar{\theta}_A^2}\right).$$

The marginal type $\bar{\theta}_A$ must be indifferent between exerting no effort and exerting effort once. Hence,

$$c = \bar{\theta}_A(\mu_{10} - \mu_{00}) = \frac{\bar{\theta}_A\left(\frac{1}{3} + \bar{\theta}_A^2 - \frac{4}{3}\bar{\theta}_A^3\right)}{1-\bar{\theta}_A^4}.$$

Equivalently,

$$c = \frac{\bar{\theta}_A(4\bar{\theta}_A^2 + \bar{\theta}_A + 1)}{3(1+\bar{\theta}_A)(1+\bar{\theta}_A^2)}.$$

For all $\bar{\theta}_A < 1$, this expression is strictly below $\frac{1}{2}$, since

$$\frac{1}{2} - \frac{\bar{\theta}_A(4\bar{\theta}_A^2 + \bar{\theta}_A + 1)}{3(1+\bar{\theta}_A)(1+\bar{\theta}_A^2)} = \frac{(1-\bar{\theta}_A)(5\bar{\theta}_A^2 + 4\bar{\theta}_A + 3)}{6(1+\bar{\theta}_A)(1+\bar{\theta}_A^2)} > 0.$$

Thus, the one-threshold active-signaling system can only generate costs $c < \frac{1}{2}$, with $c \to \frac{1}{2}$ only as $\bar{\theta}_A \to 1$. Consequently, for $c \ge \frac{1}{2}$, the selected equilibrium has no costly high effort by any type.

Medium costs. Consider now the cost region in which the selected active-signaling equilibrium has one threshold. Types below the threshold exert no high effort, while types above the threshold exert high effort exactly once:

$$\theta_i \leq \bar{\theta}_A(c) \Rightarrow (e_1, e_2) = (0, 0), \qquad \theta_i > \bar{\theta}_A(c) \Rightarrow e_1 + e_2 = 1.$$

There are three timing equilibria. First, all active types may exert effort only in the first period. Second, all active types may exert effort only in the second period. Third, active types may mix symmetrically between first- and second-period effort. For any fixed $\varepsilon > 0$, asymmetric interior mixing does not preserve indifference, because low-effort types can also generate success. Hence, the only interior mixed timing equilibrium is the symmetric one. In all three timing equilibria, the same threshold $\bar{\theta}_A(c)$ separates inactive from active types, and all active types exert effort exactly once.

For the symmetric mixed equilibrium, the limiting likelihoods are

$$\Pr(S_1 = 0, S_2 = 0 \mid \theta_i) = \begin{cases} 1 & \text{if } \theta_i < \bar{\theta}_A, \\ 1 - \theta_i & \text{if } \theta_i > \bar{\theta}_A, \end{cases} \tag{A.5}$$

$$\Pr(S_1 = 1, S_2 = 0 \mid \theta_i) = \Pr(S_1 = 0, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_A, \\ \frac{1}{2}\theta_i & \text{if } \theta_i > \bar{\theta}_A, \end{cases} \tag{A.6}$$

$$\Pr(S_1 = 1, S_2 = 1 \mid \theta_i) = 0 \qquad \text{in the limiting game.} \tag{A.7}$$

The on-path posterior beliefs after no success and after exactly one success are therefore

$$\begin{aligned} \mu_{00}^M(\bar{\theta}_A) &= E[\theta_i \mid S_1 = 0, S_2 = 0] \\ &= \frac{\int_0^{\bar{\theta}_A} \theta_i \, d\theta_i + \int_{\bar{\theta}_A}^1 (\theta_i - \theta_i^2) \, d\theta_i}{\int_0^{\bar{\theta}_A} 1 \, d\theta_i + \int_{\bar{\theta}_A}^1 (1 - \theta_i) \, d\theta_i} \\ &= \frac{2}{3} \left(\frac{\frac{1}{2} + \bar{\theta}_A^3}{1 + \bar{\theta}_A^2} \right), \end{aligned} \tag{A.8}$$

and

$$\begin{aligned} \mu_{10}^M(\bar{\theta}_A) = \mu_{01}^M(\bar{\theta}_A) &= E[\theta_i \mid S_1 = 1, S_2 = 0] = E[\theta_i \mid S_1 = 0, S_2 = 1] \\ &= \frac{\int_{\bar{\theta}_A}^1 \frac{1}{2}\theta_i^2 \, d\theta_i}{\int_{\bar{\theta}_A}^1 \frac{1}{2}\theta_i \, d\theta_i} \\ &= \frac{2}{3} \left(\frac{1 - \bar{\theta}_A^3}{1 - \bar{\theta}_A^2} \right). \end{aligned} \tag{A.9}$$

The two pure timing equilibria generate the same threshold. If all active types exert effort only in the first period, the limiting posterior after $(S_1, S_2) = (1, 0)$ is again given by $\mu_{10}^M(\bar{\theta}_A)$, because the factor on the likelihood of success cancels in Bayes' rule. The posterior after a success only in the second period is instead generated by low-effort success and is

$$\widetilde{\mu}_{01}^F(\bar{\theta}_A) = \frac{\int_0^{\bar{\theta}_A} \theta_i^2 \, d\theta_i + \int_{\bar{\theta}_A}^1 \theta_i^2(1-\theta_i)\, d\theta_i}{\int_0^{\bar{\theta}_A} \theta_i \, d\theta_i + \int_{\bar{\theta}_A}^1 \theta_i(1-\theta_i)\, d\theta_i}.$$

For all $\bar{\theta}_A \in (0,1)$, one has $\widetilde{\mu}_{01}^F(\bar{\theta}_A) < \mu_{10}^M(\bar{\theta}_A)$. Both posteriors are means of θ_i under densities proportional to $\theta_i w(\theta_i)$, where $w \equiv 1$ on $(0, \bar{\theta}_A)$ and $w(\theta_i) = 1 - \theta_i$ above $\bar{\theta}_A$ for $\widetilde{\mu}_{01}^F$, while $w(\theta_i) = \mathbb{1}\{\theta_i > \bar{\theta}_A\}$ for μ_{10}^M. The likelihood ratio of the latter density to the former is zero below $\bar{\theta}_A$ and increasing above it. Therefore, the density associated with μ_{10}^M dominates in the monotone likelihood ratio order and has a strictly larger mean. Hence, active types do not want to switch effort from the first to the second period. The pure second-period timing equilibrium is symmetric.

The marginal type $\bar{\theta}_A$ is indifferent between exerting no high effort and exerting high effort exactly once. Hence,

$$U_0(\bar{\theta}_A) = U_1(\bar{\theta}_A),$$

or equivalently,

$$c = \bar{\theta}_A \left(\mu_{10}^M - \mu_{00}^M\right).$$

Substituting (A.8) and (A.9) yields

$$c = \frac{\bar{\theta}_A \left(\frac{1}{3} + \bar{\theta}_A^2 - \frac{4}{3}\bar{\theta}_A^3\right)}{1 - \bar{\theta}_A^4}. \tag{A.10}$$

It remains to verify that active types do not want to exert high effort twice. With $\varepsilon > 0$, two successes can occur even if all active types exert high effort only once. Thus, the posterior after two successes is pinned down by Bayes' rule in the perturbed game. For the incentive check, however, it is sufficient to use the upper bound $\mu_{11} \leq 1$. If no type wants to exert effort twice even when two successes generate the highest possible posterior belief, then no type wants to exert effort twice under the Bayesian posterior induced by the $\varepsilon > 0$ perturbation.

Using the upper bound $\mu_{11} = 1$, the incremental value of adding a second effort, starting from one effort, is bounded above by

$$\Delta_{12}(\theta_i) \leq \theta_i \left[\theta_i(1 - \mu_{10}^M) + (1 - \theta_i)(\mu_{10}^M - \mu_{00}^M)\right] - c.$$

The one-effort equilibrium is therefore valid whenever this upper bound is non-positive for all $\theta_i \in [\bar{\theta}_A, 1]$. Substituting (A.8), (A.9), and (A.10), this condition is satisfied for

$$\bar{\theta}_A \geq \frac{1}{2}.$$

At $\bar{\theta}_A = \frac{1}{2}$, equation (A.10) gives

$$c = \frac{2}{9}.$$

As $\bar{\theta}_A \to 1$, equation (A.10) implies $c \to \frac{1}{2}$. Hence, the selected one-threshold active-signaling equilibria are described by this system for

$$\frac{2}{9} \leq c < \frac{1}{2}.$$

In all three timing equilibria in this cost region, the same threshold $\bar{\theta}_A(c)$ separates inactive from active types, and all active types exert effort exactly once. Therefore, total expected effort is identical across the three timing equilibria.

Low costs. For $0 < c < \frac{2}{9}$, there exists an active-signaling equilibrium with more signaling than the one-threshold equilibrium: high types exert effort in both periods. Since the equilibrium selection in the main text focuses on maximal signaling activity, this two-threshold equilibrium is selected in the low-cost region.

The equilibrium has two thresholds, $\bar{\theta}_A(c)$ and $\bar{\theta}_B(c)$, with

$$0 < \bar{\theta}_A(c) < \bar{\theta}_B(c) < 1.$$

Types below $\bar{\theta}_A(c)$ exert no high effort, types between $\bar{\theta}_A(c)$ and $\bar{\theta}_B(c)$ exert high effort exactly once, and types above $\bar{\theta}_B(c)$ exert high effort in both periods.

The timing of effort by the middle types is pinned down by the requirement that they must be indifferent between exerting effort only in the first period and exerting effort only in the second period. To see this, suppose that middle types exert effort in the first period with probability q and in the second period with probability $1 - q$. Then

$$\mu_{10}(q) = \frac{\int_{\bar{\theta}_A}^{\bar{\theta}_B} q\theta_i^2 \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i^2(1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_A}^{\bar{\theta}_B} q\theta_i \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i(1-\theta_i) \, d\theta_i},$$

$$\mu_{01}(q) = \frac{\int_{\bar{\theta}_A}^{\bar{\theta}_B} (1-q)\theta_i^2 \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i^2(1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_A}^{\bar{\theta}_B} (1-q)\theta_i \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i(1-\theta_i) \, d\theta_i}.$$

The high types, who exert effort in both periods, contribute symmetrically to both one-success outcomes. The middle types, however, contribute with weights q and $1-q$. Solving $\mu_{10}(q) = \mu_{01}(q)$ yields $q = \frac{1}{2}$. Thus, in the low-cost region, middle types must mix symmetrically between first- and second-period effort.

Given this equilibrium strategy, the likelihoods are

$$\Pr(S_1 = 0, S_2 = 0 \mid \theta_i) = \begin{cases} 1 & \text{if } \theta_i < \bar{\theta}_A, \\ 1-\theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1-\theta_i)^2 & \text{if } \theta_i > \bar{\theta}_B, \end{cases} \tag{A.11}$$

$$\Pr(S_1 = 1, S_2 = 0 \mid \theta_i) = \Pr(S_1 = 0, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_A, \\ \frac{1}{2}\theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ \theta_i(1-\theta_i) & \text{if } \theta_i > \bar{\theta}_B, \end{cases} \tag{A.12}$$

$$\Pr(S_1 = 1, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_B, \\ \theta_i^2 & \text{if } \theta_i > \bar{\theta}_B. \end{cases} \tag{A.13}$$

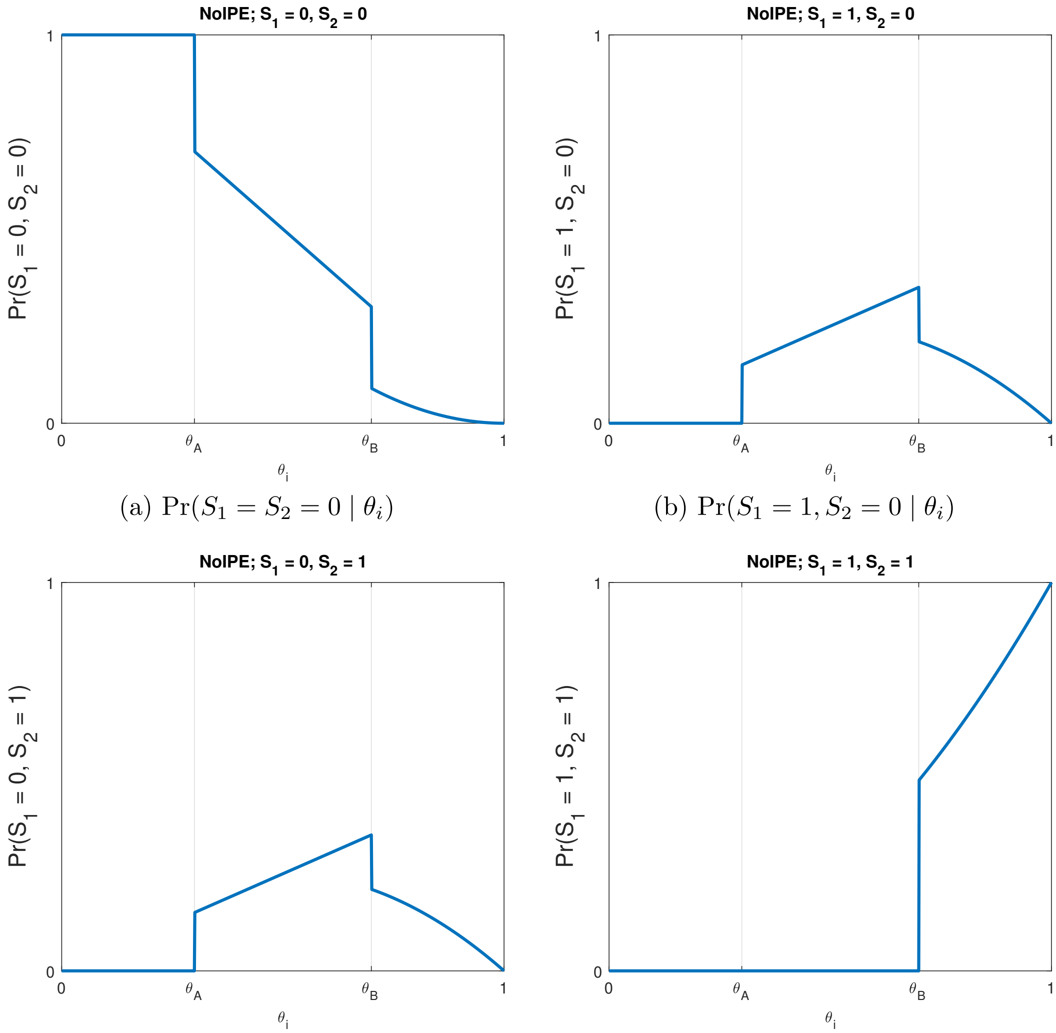
Figure A1 illustrates these likelihoods for selected threshold values $\bar{\theta}_A$ and $\bar{\theta}_B$.

The posterior belief after no success is

$$\begin{aligned} \mu_{00}^L(\bar{\theta}_A, \bar{\theta}_B) &= E[\theta_i \mid S_1 = 0, S_2 = 0] \\ &= \frac{\int_0^{\bar{\theta}_A} \theta_i \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (\theta_i - \theta_i^2) \, d\theta_i + \int_{\bar{\theta}_B}^1 \theta_i (1-\theta_i)^2 \, d\theta_i}{\int_0^{\bar{\theta}_A} 1 \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (1-\theta_i) \, d\theta_i + \int_{\bar{\theta}_B}^1 (1-\theta_i)^2 \, d\theta_i} \\ &= \frac{1}{2} \left(\frac{1 + 4\bar{\theta}_A^3 + 4\bar{\theta}_B^3 - 3\bar{\theta}_B^4}{2 + 3\bar{\theta}_A^2 + 3\bar{\theta}_B^2 - 2\bar{\theta}_B^3} \right). \end{aligned} \tag{A.14}$$

The posterior after exactly one success is

$$\begin{aligned} \mu_{10}^L(\bar{\theta}_A, \bar{\theta}_B) = \mu_{01}^L(\bar{\theta}_A, \bar{\theta}_B) &= E[\theta_i \mid S_1 = 1, S_2 = 0] = E[\theta_i \mid S_1 = 0, S_2 = 1] \\ &= \frac{\int_{\bar{\theta}_A}^{\bar{\theta}_B} \frac{1}{2}\theta_i^2 \, d\theta_i + \int_{\bar{\theta}_B}^1 \theta_i^2 (1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_A}^{\bar{\theta}_B} \frac{1}{2}\theta_i \, d\theta_i + \int_{\bar{\theta}_B}^1 \theta_i (1-\theta_i) \, d\theta_i} \\ &= \frac{1 - 2\bar{\theta}_A^3 - 2\bar{\theta}_B^3 + 3\bar{\theta}_B^4}{2 - 3\bar{\theta}_A^2 - 3\bar{\theta}_B^2 + 4\bar{\theta}_B^3}. \end{aligned} \tag{A.15}$$



(a) $\Pr(S_1 = S_2 = 0 \mid \theta_i)$

(b) $\Pr(S_1 = 1, S_2 = 0 \mid \theta_i)$

(c) $\Pr(S_1 = 0, S_2 = 1 \mid \theta_i)$

(d) $\Pr(S_1 = S_2 = 1 \mid \theta_i)$

Figure A1: NoIPE: likelihood that a type θ_i generates a given outcome (S_1, S_2) in the low-cost two-threshold equilibrium.

Finally, the posterior after two successes is

$$\begin{aligned} \mu^L_{11}(\bar\theta_B) &= E[\theta_i \mid S_1 = 1, S_2 = 1] \\ &= \frac{\int_{\bar\theta_B}^1 \theta_i^3 \, d\theta_i}{\int_{\bar\theta_B}^1 \theta_i^2 \, d\theta_i} = \frac{3}{4}\left(\frac{1-\bar\theta_B^4}{1-\bar\theta_B^3}\right). \end{aligned} \tag{A.16}$$

The two equilibrium thresholds are determined by two indifference conditions. First, the lowest active type $\bar\theta_A$ is indifferent between no effort and one effort:

$$U_0(\bar\theta_A) = U_1(\bar\theta_A).$$

Using (A.1) and (A.2), this is equivalent to

$$c = \bar{\theta}_A \left(\mu_{10}^L - \mu_{00}^L \right). \tag{A.17}$$

Second, the type $\bar{\theta}_B$ is indifferent between exerting effort once and exerting effort twice:

$$U_1(\bar{\theta}_B) = U_{12}(\bar{\theta}_B).$$

Using (A.2) and (A.4), this is equivalent to

$$c = \bar{\theta}_B \left[\bar{\theta}_B \left(\mu_{11}^L - \mu_{10}^L \right) + (1 - \bar{\theta}_B) \left(\mu_{10}^L - \mu_{00}^L \right) \right]. \tag{A.18}$$

Equations (A.17) and (A.18) define $\bar{\theta}_A(c)$ and $\bar{\theta}_B(c)$ in the low-cost region. The solution satisfies

$$0 < \bar{\theta}_A(c) < \bar{\theta}_B(c) < 1$$

for $0 < c < \frac{2}{9}$. At the boundary $c = \frac{2}{9}$, the high-effort region vanishes, so $\bar{\theta}_B(c) \to 1$, and the low-cost threshold system connects continuously to the selected one-threshold equilibrium.

The incentive constraints are satisfied by the threshold construction. The gain from moving from no effort to one effort is

$$\theta_i(\mu_{10}^L - \mu_{00}^L) - c,$$

which is increasing in θ_i and equals zero at $\theta_i = \bar{\theta}_A$. Hence, types below $\bar{\theta}_A$ prefer no effort, while types above $\bar{\theta}_A$ prefer at least one effort. The second threshold $\bar{\theta}_B$ is defined by the indifference condition between one effort and two efforts. At the threshold pair $(\bar{\theta}_A(c), \bar{\theta}_B(c))$ defined by (A.17) and (A.18), the remaining incentive constraints are satisfied: types between $\bar{\theta}_A(c)$ and $\bar{\theta}_B(c)$ prefer exerting effort exactly once, while types above $\bar{\theta}_B(c)$ prefer exerting effort in both periods. The solution satisfies $\bar{\theta}_B(c) \to 1$ as $c \to \frac{2}{9}$, so the two-threshold equilibrium connects continuously to the selected one-threshold equilibrium at $c = \frac{2}{9}$.

Combining the pooling-equilibrium discussion with the low-, medium-, and high-cost active-signaling arguments establishes the selected threshold structure stated in Proposition 1. □

A2 IPE: derivation of Proposition 2

Throughout this appendix, I characterize the selected active-signaling equilibrium in the limiting case $\varepsilon \to 0$. For expositional simplicity, I write low effort as 0. Formally, this corresponds to choosing effort $\varepsilon > 0$ and then taking the limit as $\varepsilon \to 0$. As in the NoIPE regime, pooling low-effort equilibria may also exist. The purpose of this section is to derive the selected active-signaling equilibrium described in Proposition 2.

Proof of Proposition 2. Let

$$\mu_{ab} \equiv E[\theta_i \mid S_1 = a, S_2 = b]$$

denote the principal's posterior belief after observing outcome $(S_1, S_2) = (a, b)$.

Under IPE, the agent observes S_1 before choosing second-period effort. Hence, in addition to exerting effort in no period, only the first period, only the second period, or both periods, the agent can condition second-period effort on the first-period outcome. The relevant strategies are:

$$0 : (0, 0), \qquad 1 : (1, 0), \qquad 2 : (0, 1),$$

$$C : e_1 = 1, \quad e_2 = 0 \text{ if } S_1 = 1, \quad e_2 = 1 \text{ if } S_1 = 0,$$

and

$$B : (1, 1).$$

The conditional strategy C is the strategy that is central under IPE: the agent exerts effort in the first period and only tries again in the second period if first-period effort did not lead to success.

Given posterior beliefs $(\mu_{00}, \mu_{10}, \mu_{01}, \mu_{11})$, the expected utilities from these strategies are

$$U_0(\theta_i) = \mu_{00}, \tag{A.19}$$

$$U_1(\theta_i) = \theta_i\mu_{10} + (1 - \theta_i)\mu_{00} - c, \tag{A.20}$$

$$U_2(\theta_i) = \theta_i\mu_{01} + (1 - \theta_i)\mu_{00} - c, \tag{A.21}$$

$$U_C(\theta_i) = \theta_i\mu_{10} + (1 - \theta_i)\left[\theta_i\mu_{01} + (1 - \theta_i)\mu_{00} - c\right] - c, \tag{A.22}$$

$$U_B(\theta_i) = \theta_i^2\mu_{11} + \theta_i(1 - \theta_i)\mu_{10} + (1 - \theta_i)\theta_i\mu_{01} + (1 - \theta_i)^2\mu_{00} - 2c. \tag{A.23}$$

There is also the reverse conditional strategy, where the agent exerts second-period effort only after first-period success. This strategy is not selected in the equilibria characterized below. For the threshold values solving the systems below, the value of second-period effort after failure is weakly larger than the value of second-period effort after success in the relevant range of types. Thus, a strategy that prescribes effort after success but not after failure is not optimal.

The proof proceeds by deriving the equilibrium threshold systems for the low-, medium-, and high-cost regions.

Low and medium cost candidate strategies. For low and medium costs, the selected active-signaling equilibrium has three thresholds,

$$0 < \bar{\theta}_A(c) < \bar{\theta}_B(c) < \bar{\theta}_C(c) < 1.$$

Low types do not exert effort, intermediate types exert effort exactly once, higher intermediate types use the conditional strategy, and the highest types exert effort in both periods.

For low costs, the one-effort types exert effort only in the second period. The candidate strategy is

$$(e_1(\theta_i), e_2(\theta_i)) = \begin{cases} (0,0) & \text{if } \theta_i < \bar{\theta}_A, \\ (0,1) & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1,0) & \text{if } \bar{\theta}_B < \theta_i < \bar{\theta}_C \text{ and } S_1 = 1, \\ (1,1) & \text{if } \bar{\theta}_B < \theta_i < \bar{\theta}_C \text{ and } S_1 = 0, \\ (1,1) & \text{if } \theta_i > \bar{\theta}_C. \end{cases} \tag{A.24}$$

For medium costs, the one-effort types exert effort only in the first period. The candidate strategy is

$$(e_1(\theta_i), e_2(\theta_i)) = \begin{cases} (0,0) & \text{if } \theta_i < \bar{\theta}_A, \\ (1,0) & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1,0) & \text{if } \bar{\theta}_B < \theta_i < \bar{\theta}_C \text{ and } S_1 = 1, \\ (1,1) & \text{if } \bar{\theta}_B < \theta_i < \bar{\theta}_C \text{ and } S_1 = 0, \\ (1,1) & \text{if } \theta_i > \bar{\theta}_C. \end{cases} \tag{A.25}$$

The difference between the low- and medium-cost regions is therefore the timing of effort by types in $(\bar{\theta}_A, \bar{\theta}_B)$. For low costs, these types prefer to exert effort only in the second period because the posterior belief after $(S_1, S_2) = (0, 1)$ is higher than the posterior belief after $(S_1, S_2) = (1, 0)$. For higher costs, the set of very high types who exert effort in both periods becomes smaller, reducing the reputational value of $(S_1, S_2) = (0, 1)$. At the cutoff between the two regions, the one-effort types switch from second-period effort to first-period effort.

Likelihoods. The principal observes (S_1, S_2) and knows that IPE is implemented. Under the low-cost strategy in (A.24), the likelihoods are

$$\Pr(S_1 = 0, S_2 = 0 \mid \theta_i) = \begin{cases} 1 & \text{if } \theta_i < \bar{\theta}_A, \\ 1 - \theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1 - \theta_i)^2 & \text{if } \bar{\theta}_B < \theta_i, \end{cases} \tag{A.26}$$

$$\Pr(S_1 = 1, S_2 = 0 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_B, \\ \theta_i & \text{if } \bar{\theta}_B < \theta_i < \bar{\theta}_C, \\ \theta_i(1 - \theta_i) & \text{if } \theta_i > \bar{\theta}_C, \end{cases} \tag{A.27}$$

$$\Pr(S_1 = 0, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_A, \\ \theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ \theta_i(1 - \theta_i) & \text{if } \bar{\theta}_B < \theta_i, \end{cases} \tag{A.28}$$

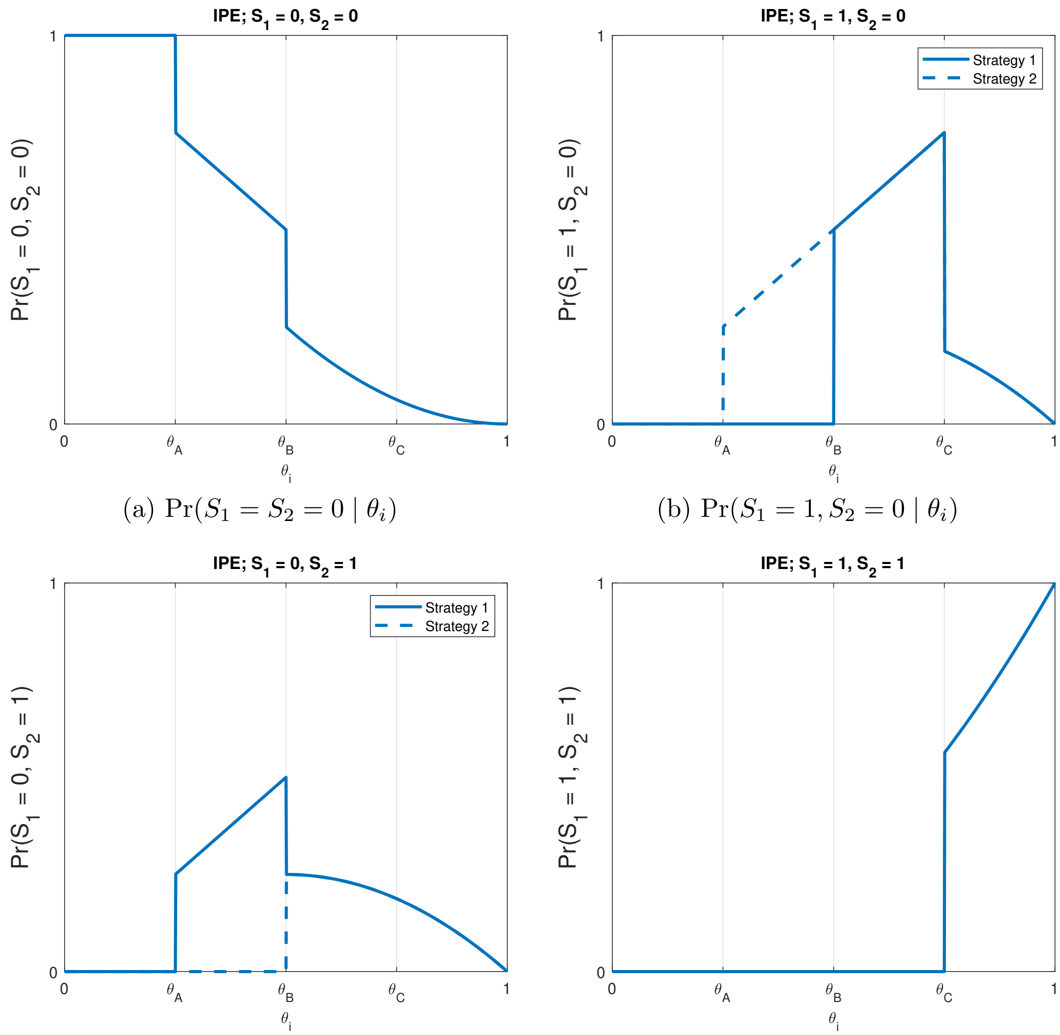
$$\Pr(S_1 = 1, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_C, \\ \theta_i^2 & \text{if } \theta_i > \bar{\theta}_C. \end{cases} \tag{A.29}$$

Under the medium-cost strategy in (A.25), the likelihoods of $(S_1, S_2) = (0, 0)$ and $(S_1, S_2) = (1, 1)$ are unchanged, while the likelihoods of the one-success outcomes become

$$\Pr(S_1 = 1, S_2 = 0 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_A, \\ \theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_C, \\ \theta_i(1 - \theta_i) & \text{if } \theta_i > \bar{\theta}_C, \end{cases} \tag{A.30}$$

$$\Pr(S_1 = 0, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_B, \\ \theta_i(1 - \theta_i) & \text{if } \bar{\theta}_B < \theta_i. \end{cases} \tag{A.31}$$

Figure A2 illustrates these likelihoods for selected threshold values.



(a) $\Pr(S_1 = S_2 = 0 \mid \theta_i)$ (b) $\Pr(S_1 = 1, S_2 = 0 \mid \theta_i)$

(c) $\Pr(S_1 = 0, S_2 = 1 \mid \theta_i)$ (d) $\Pr(S_1 = S_2 = 1 \mid \theta_i)$

Figure A2: IPE: likelihood that a type θ_i generates a given outcome (S_1, S_2). The solid lines correspond to the low-cost strategy in (A.24), and the dashed lines correspond to the medium-cost strategy in (A.25).

Posterior beliefs in the low-cost region. Based on the likelihoods above, the posterior belief after no success is

$$\begin{aligned}
\mu_{00}^L(\bar{\theta}_A, \bar{\theta}_B) &= E[\theta_i \mid S_1 = 0, S_2 = 0] \\
&= \frac{\int_0^{\bar{\theta}_A} \theta_i \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (\theta_i - \theta_i^2) \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i (1-\theta_i)^2 \, d\theta_i}{\int_0^{\bar{\theta}_A} 1 \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (1-\theta_i) \, d\theta_i + \int_{\bar{\theta}_B}^{1} (1-\theta_i)^2 \, d\theta_i} \\
&= \frac{1}{2} \left(\frac{1 + 4\bar{\theta}_A^3 + 4\bar{\theta}_B^3 - 3\bar{\theta}_B^4}{2 + 3\bar{\theta}_A^2 + 3\bar{\theta}_B^2 - 2\bar{\theta}_B^3} \right). \qquad (A.32)
\end{aligned}$$

The posterior belief after success only in the first period is

$$\begin{aligned}
\mu_{10}^{L}(\bar{\theta}_B, \bar{\theta}_C) &= E[\theta_i \mid S_1 = 1, S_2 = 0] \\
&= \frac{\int_{\bar{\theta}_B}^{\bar{\theta}_C} \theta_i^2 \, d\theta_i + \int_{\bar{\theta}_C}^{1} \theta_i^2 (1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_B}^{\bar{\theta}_C} \theta_i \, d\theta_i + \int_{\bar{\theta}_C}^{1} \theta_i (1-\theta_i) \, d\theta_i} \\
&= \frac{1}{2} \left(\frac{1 - 4\bar{\theta}_B^3 + 3\bar{\theta}_C^4}{1 - 3\bar{\theta}_B^2 + 2\bar{\theta}_C^3} \right). \qquad \text{(A.33)}
\end{aligned}$$

The posterior belief after success only in the second period is

$$\begin{aligned}
\mu_{01}^{L}(\bar{\theta}_A, \bar{\theta}_B) &= E[\theta_i \mid S_1 = 0, S_2 = 1] \\
&= \frac{\int_{\bar{\theta}_A}^{\bar{\theta}_B} \theta_i^2 \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i^2 (1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_A}^{\bar{\theta}_B} \theta_i \, d\theta_i + \int_{\bar{\theta}_B}^{1} \theta_i (1-\theta_i) \, d\theta_i} \\
&= \frac{1}{2} \left(\frac{1 - 4\bar{\theta}_A^3 + 3\bar{\theta}_B^4}{1 - 3\bar{\theta}_A^2 + 2\bar{\theta}_B^3} \right). \qquad \text{(A.34)}
\end{aligned}$$

Finally, the posterior belief after two successes is

$$\begin{aligned}
\mu_{11}^{L}(\bar{\theta}_C) &= E[\theta_i \mid S_1 = 1, S_2 = 1] \\
&= \frac{\int_{\bar{\theta}_C}^{1} \theta_i^3 \, d\theta_i}{\int_{\bar{\theta}_C}^{1} \theta_i^2 \, d\theta_i} = \frac{3}{4} \left(\frac{1 - \bar{\theta}_C^4}{1 - \bar{\theta}_C^3} \right). \qquad \text{(A.35)}
\end{aligned}$$

Posterior beliefs in the medium-cost region. In the medium-cost region, μ_{00} and μ_{11} are given by the same formulas as in the low-cost region:

$$\mu_{00}^{M}(\bar{\theta}_A, \bar{\theta}_B) = \mu_{00}^{L}(\bar{\theta}_A, \bar{\theta}_B), \qquad \mu_{11}^{M}(\bar{\theta}_C) = \mu_{11}^{L}(\bar{\theta}_C).$$

The posterior belief after success only in the first period is

$$\begin{aligned}
\mu_{10}^{M}(\bar{\theta}_A, \bar{\theta}_C) &= E[\theta_i \mid S_1 = 1, S_2 = 0] \\
&= \frac{\int_{\bar{\theta}_A}^{\bar{\theta}_C} \theta_i^2 \, d\theta_i + \int_{\bar{\theta}_C}^{1} \theta_i^2 (1-\theta_i) \, d\theta_i}{\int_{\bar{\theta}_A}^{\bar{\theta}_C} \theta_i \, d\theta_i + \int_{\bar{\theta}_C}^{1} \theta_i (1-\theta_i) \, d\theta_i} \\
&= \frac{1}{2} \left(\frac{1 - 4\bar{\theta}_A^3 + 3\bar{\theta}_C^4}{1 - 3\bar{\theta}_A^2 + 2\bar{\theta}_C^3} \right). \qquad \text{(A.36)}
\end{aligned}$$

The posterior belief after success only in the second period is

$$
\begin{aligned}
\mu_{01}^{M}(\bar{\theta}_B) &= E[\theta_i \mid S_1 = 0, S_2 = 1] \\
&= \frac{\int_{\bar{\theta}_B}^{1} \theta_i^2 (1-\theta_i)\, d\theta_i}{\int_{\bar{\theta}_B}^{1} \theta_i (1-\theta_i)\, d\theta_i} \\
&= \frac{1}{2} \left(\frac{1 - 4\bar{\theta}_B^3 + 3\bar{\theta}_B^4}{1 - 3\bar{\theta}_B^2 + 2\bar{\theta}_B^3} \right).
\end{aligned} \tag{A.37}
$$

Threshold equations in the low-cost region. In the low-cost region, the thresholds are determined by three indifference conditions. First, the lowest active type $\bar{\theta}_A$ is indifferent between no effort and effort only in the second period:

$$U_0(\bar{\theta}_A) = U_2(\bar{\theta}_A),$$

which is equivalent to

$$c = \bar{\theta}_A \left(\mu_{01}^{L} - \mu_{00}^{L} \right). \tag{A.38}$$

Second, type $\bar{\theta}_B$ is indifferent between effort only in the second period and the conditional strategy:

$$U_2(\bar{\theta}_B) = U_C(\bar{\theta}_B).$$

Using (A.21) and (A.22), this is equivalent to

$$c = \frac{\bar{\theta}_B}{1 - \bar{\theta}_B} \left[\mu_{10}^{L} - \bar{\theta}_B \mu_{01}^{L} - (1 - \bar{\theta}_B) \mu_{00}^{L} \right]. \tag{A.39}$$

Third, type $\bar{\theta}_C$ is indifferent between the conditional strategy and exerting effort in both periods:

$$U_C(\bar{\theta}_C) = U_B(\bar{\theta}_C).$$

This is equivalent to

$$c = \bar{\theta}_C \left(\mu_{11}^{L} - \mu_{10}^{L} \right). \tag{A.40}$$

Equations (A.38)–(A.40), together with the posterior beliefs (A.32)–(A.35), define the low-cost thresholds $(\bar{\theta}_A(c), \bar{\theta}_B(c), \bar{\theta}_C(c))$.

This low-cost system applies as long as the one-effort types prefer second-period effort to first-period effort, that is, as long as

$$\mu_{01}^{L} \geq \mu_{10}^{L}.$$

The cutoff c_I^L is defined by the boundary at which this inequality holds with equality.

Threshold equations in the medium-cost region. In the medium-cost region, the one-effort types exert effort only in the first period. The thresholds are again determined by three indifference conditions. First,

$$U_0(\bar{\theta}_A) = U_1(\bar{\theta}_A),$$

which gives

$$c = \bar{\theta}_A \left(\mu_{10}^{M} - \mu_{00}^{M}\right). \tag{A.41}$$

Second,

$$U_1(\bar{\theta}_B) = U_C(\bar{\theta}_B),$$

which gives

$$c = \bar{\theta}_B \left(\mu_{01}^{M} - \mu_{00}^{M}\right). \tag{A.42}$$

Third,

$$U_C(\bar{\theta}_C) = U_B(\bar{\theta}_C),$$

which gives

$$c = \bar{\theta}_C \left(\mu_{11}^{M} - \mu_{10}^{M}\right). \tag{A.43}$$

Equations (A.41)–(A.43), together with the posterior beliefs above, define the medium-cost thresholds. This system applies as long as the one-effort types prefer first-period effort to second-period effort,

$$\mu_{10}^{M} \geq \mu_{01}^{M},$$

and as long as $\bar{\theta}_C(c) < 1$. The cutoff c_I^H is defined by

$$\bar{\theta}_C(c_I^H) = 1.$$

High-cost active-signaling region. For higher costs, no type exerts effort unconditionally in both periods. The selected equilibrium is therefore obtained from the medium-cost equilibrium by setting $\bar{\theta}_C = 1$. The strategy has two thresholds:

$$(e_1(\theta_i), e_2(\theta_i)) = \begin{cases} (0,0) & \text{if } \theta_i < \bar{\theta}_A, \\ (1,0) & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1,0) & \text{if } \theta_i > \bar{\theta}_B \text{ and } S_1 = 1, \\ (1,1) & \text{if } \theta_i > \bar{\theta}_B \text{ and } S_1 = 0. \end{cases} \tag{A.44}$$

The likelihoods are

$$\Pr(S_1 = 0, S_2 = 0 \mid \theta_i) = \begin{cases} 1 & \text{if } \theta_i < \bar{\theta}_A, \\ 1 - \theta_i & \text{if } \bar{\theta}_A < \theta_i < \bar{\theta}_B, \\ (1-\theta_i)^2 & \text{if } \bar{\theta}_B < \theta_i, \end{cases} \tag{A.45}$$

$$\Pr(S_1 = 1, S_2 = 0 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_A, \\ \theta_i & \text{if } \bar{\theta}_A < \theta_i, \end{cases} \tag{A.46}$$

$$\Pr(S_1 = 0, S_2 = 1 \mid \theta_i) = \begin{cases} 0 & \text{if } \theta_i < \bar{\theta}_B, \\ \theta_i(1-\theta_i) & \text{if } \bar{\theta}_B < \theta_i, \end{cases} \tag{A.47}$$

$$\Pr(S_1 = 1, S_2 = 1 \mid \theta_i) = 0 \qquad \text{in the limiting game.} \tag{A.48}$$

The posterior beliefs used to determine the two thresholds are

$$\begin{aligned} \mu_{00}^H(\bar{\theta}_A, \bar{\theta}_B) &= E[\theta_i \mid S_1 = 0, S_2 = 0] \\ &= \frac{\int_0^{\bar{\theta}_A} \theta_i \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (\theta_i - \theta_i^2) \, d\theta_i + \int_{\bar{\theta}_B}^1 \theta_i (1-\theta_i)^2 \, d\theta_i}{\int_0^{\bar{\theta}_A} 1 \, d\theta_i + \int_{\bar{\theta}_A}^{\bar{\theta}_B} (1-\theta_i) \, d\theta_i + \int_{\bar{\theta}_B}^1 (1-\theta_i)^2 \, d\theta_i} \\ &= \frac{1}{2} \left(\frac{1 + 4\bar{\theta}_A^3 + 4\bar{\theta}_B^3 - 3\bar{\theta}_B^4}{2 + 3\bar{\theta}_A^2 + 3\bar{\theta}_B^2 - 2\bar{\theta}_B^3} \right), \end{aligned} \tag{A.49}$$

$$\begin{aligned} \mu_{10}^H(\bar{\theta}_A) &= E[\theta_i \mid S_1 = 1, S_2 = 0] \\ &= \frac{\int_{\bar{\theta}_A}^1 \theta_i^2 \, d\theta_i}{\int_{\bar{\theta}_A}^1 \theta_i \, d\theta_i} = \frac{2}{3} \left(\frac{1 - \bar{\theta}_A^3}{1 - \bar{\theta}_A^2} \right), \end{aligned} \tag{A.50}$$

and

$$\mu_{01}^H(\bar{\theta}_B) = E[\theta_i \mid S_1 = 0, S_2 = 1]$$
$$= \frac{\int_{\bar{\theta}_B}^1 \theta_i^2(1-\theta_i)\,d\theta_i}{\int_{\bar{\theta}_B}^1 \theta_i(1-\theta_i)\,d\theta_i} = \frac{1}{2}\left(\frac{1-4\bar{\theta}_B^3+3\bar{\theta}_B^4}{1-3\bar{\theta}_B^2+2\bar{\theta}_B^3}\right). \tag{A.51}$$

In the limiting game, $(S_1, S_2) = (1, 1)$ is not reached under the high-cost strategy. With $\varepsilon > 0$, this outcome has positive probability and the posterior is pinned down by Bayes' rule. For the active-signaling incentive check, it is sufficient to use the upper bound

$$\mu_{11}^H \leq 1.$$

Thus, if no type wants to deviate to unconditional effort in both periods even when $\mu_{11}^H = 1$, then no type wants to do so under the Bayesian posterior generated by the perturbed game.

The thresholds in the high-cost region are determined by

$$U_0(\bar{\theta}_A) = U_1(\bar{\theta}_A)$$

and

$$U_1(\bar{\theta}_B) = U_C(\bar{\theta}_B).$$

Using the posterior beliefs above, these conditions become

$$c = \bar{\theta}_A\left(\mu_{10}^H - \mu_{00}^H\right), \tag{A.52}$$

and

$$c = \bar{\theta}_B\left(\mu_{01}^H - \mu_{00}^H\right). \tag{A.53}$$

In addition, no type must want to deviate from the conditional strategy to unconditional effort in both periods. Using the upper bound $\mu_{11}^H = 1$, this is ensured by

$$c \geq 1 - \mu_{10}^H.$$

This condition holds in the high-cost region beginning at c_I^H, where $\bar{\theta}_C = 1$ in the medium-cost threshold system.

Finally, as c approaches $\frac{1}{2}$, the active set shrinks to zero. Hence, for $c \geq \frac{1}{2}$, the selected active-signaling equilibrium entails no costly high effort by any type.

Combining the low-, medium-, and high-cost threshold systems establishes the selected active-signaling equilibrium structure stated in Proposition 2. □

A3 Proof of Proposition 3

Throughout, $c \in (0, \frac{1}{2})$ denotes the marginal cost of high effort, and we work with the selected active-signaling equilibria characterized in Propositions 1 and 2 in the limit $\varepsilon \to 0$. We write $\bar{\theta}_A^N, \bar{\theta}_B^N$ for the NoIPE cut-offs and $\bar{\theta}_A^I \leq \bar{\theta}_B^I \leq \bar{\theta}_C^I$ for the IPE cut-offs, and we denote by

$$\mathcal{E}^{NoIPE}(c) \;=\; \mathbb{E}[e_1 + e_2]\Big|_{\text{NoIPE}}, \qquad \mathcal{E}^{IPE}(c) \;=\; \mathbb{E}[e_1 + e_2]\Big|_{\text{IPE}}$$

the corresponding expected total effort (the integral over types of the sum of the two effort probabilities). Define the difference

$$\Delta(c) \;\equiv\; \mathcal{E}^{IPE}(c) - \mathcal{E}^{NoIPE}(c).$$

Proposition 3 states that $\Delta(c) < 0$ for sufficiently small c, that $\Delta(c) > 0$ for c sufficiently large (but below $\frac{1}{2}$), and that $\Delta(c) = 0$ for $c \geq \frac{1}{2}$.

Step 0: Expected total effort as a function of the cut-offs

Integrating the equilibrium effort choices of Propositions 1–2 over $\theta \sim U[0,1]$ gives closed forms for total effort in terms of the cut-offs. Under NoIPE, types in $(\bar{\theta}_A^N, \bar{\theta}_B^N)$ exert effort once and types above $\bar{\theta}_B^N$ exert effort in both periods, so

$$\mathcal{E}^{NoIPE}(c) = \begin{cases} 2 - \bar{\theta}_A^N - \bar{\theta}_B^N, & 0 \leq c < \frac{2}{9}, \\ 1 - \bar{\theta}_A^N, & \frac{2}{9} \leq c < \frac{1}{2}, \\ 0, & c \geq \frac{1}{2}. \end{cases} \tag{A.54}$$

Under IPE, types in $(\bar{\theta}_A^I, \bar{\theta}_B^I)$ exert effort once, types in $(\bar{\theta}_B^I, \bar{\theta}_C^I)$ follow the conditional strategy $\mathcal{C}$ (effort in period 1, and in period 2 only after a first–period failure, i.e. expected effort $1 + (1-\theta)$), and types above $\bar{\theta}_C^I$ exert effort in both periods. Carrying out the integration,

$$\int_{\bar{\theta}_B^I}^{\bar{\theta}_C^I} \big[1 + (1-\theta)\big]\, d\theta = 2(\bar{\theta}_C^I - \bar{\theta}_B^I) - \tfrac{1}{2}\big[(\bar{\theta}_C^I)^2 - (\bar{\theta}_B^I)^2\big],$$

and collecting terms yields

$$\mathcal{E}^{IPE}(c) = \begin{cases} 2 - \bar\theta^I_A - \bar\theta^I_B - \dfrac{(\bar\theta^I_C)^2 - (\bar\theta^I_B)^2}{2}, & 0 \le c < c^I_H, \\[2ex] 1 - \bar\theta^I_A + \dfrac{(1-\bar\theta^I_B)^2}{2}, & c^I_H \le c < \frac{1}{2}, \\[2ex] 0, & c \ge \frac{1}{2}. \end{cases} \tag{A.55}$$

The first line of (A.55) is common to the low–cost ($c < c^I_L$) and the medium–cost ($c^I_L \le c < c^I_H$) regimes of Proposition 2, which share the same effort formula. The second line is obtained from the first by setting $\bar\theta^I_C = 1$ (the defining feature of the high–cost regime); indeed $2 - \bar\theta^I_A - \bar\theta^I_B - \frac{1}{2}\big[1 - (\bar\theta^I_B)^2\big] = 1 - \bar\theta^I_A + \frac{1}{2}(1-\bar\theta^I_B)^2$.

Step 1: Prohibitive costs

For $c \ge \frac{1}{2}$ no type finds active signaling worthwhile in either regime (Propositions 1 and 2), so $\mathcal{E}^{NoIPE}(c) = \mathcal{E}^{IPE}(c) = 0$ and $\Delta(c) = 0$. This establishes the claim of Proposition 3 for $c \ge \frac{1}{2}$.

Step 2: Continuity of Δ

On each open cost regime the cut-offs solve the corresponding indifference system (Propositions 1 and 2). Each such system is a finite set of polynomial equations, and at the computed solutions the Jacobian is non-singular, so by the implicit function theorem the cut-offs are continuously differentiable functions of c on each open regime.

At the regime boundaries the maps agree: at $c = \frac{2}{9}$ one has $\bar\theta^N_B \to 1$, so the two branches of (A.54) coincide; at $c = c^I_L$ the low- and medium-cost IPE systems share the same solution (the boundary is defined by $\mu_{10} = \mu_{01}$) and (A.55) uses one expression on both sides; and at $c = c^I_H$ one has $\bar\theta^I_C \to 1$, which is the identity used at the end of Step 0. Hence $\mathcal{E}^{NoIPE}$ and $\mathcal{E}^{IPE}$, and therefore Δ, are continuous on $(0, \frac{1}{2})$, with $\Delta(c) \to 0$ as $c \downarrow 0$ (both efforts tend to 2) and as $c \uparrow \frac{1}{2}$ (both efforts tend to 0).

Step 3: IPE strictly dominates at high costs

Consider $c \in [c^I_H, \frac{1}{2})$. Since $c^I_H > \frac{2}{9}$, NoIPE is in its one–threshold regime, while IPE is in its high–cost regime with $\bar\theta^I_C = 1$. Subtracting the relevant lines of (A.54) and (A.55),

$$\Delta(c) \;=\; \big(\bar\theta^N_A - \bar\theta^I_A\big) \;+\; \tfrac{1}{2}\big(1 - \bar\theta^I_B\big)^2. \tag{A.56}$$

The second term is non-negative and is strictly positive because $\bar{\theta}_B^I < 1$ for $c < \frac{1}{2}$. It remains to sign the first term.

In both regimes the marginal active type is indifferent between not signaling and exerting effort once in period 1; equating cost and signaling benefit,

$$\text{(NoIPE)} \qquad c = \bar{\theta}_A^N \left[\mu_{10}(\bar{\theta}_A^N) - \mu_{00}^N(\bar{\theta}_A^N)\right], \tag{A.57}$$

$$\text{(IPE)} \qquad c = \bar{\theta}_A^I \left[\mu_{10}(\bar{\theta}_A^I) - \mu_{00}^I(\bar{\theta}_A^I, \bar{\theta}_B^I)\right], \tag{A.58}$$

where the posteriors after a single first–period success, after a double failure, are

$$\mu_{10}(a) = \frac{2}{3}\,\frac{1-a^3}{1-a^2} = \frac{2\,(1+a+a^2)}{3\,(1+a)}, \qquad \mu_{00}^N(a) = \frac{1+2a^3}{3\,(1+a^2)},$$

$$\mu_{00}^I(a,b) = \frac{1+4a^3+4b^3-3b^4}{2\,(2+3a^2+3b^2-2b^3)}.$$

Two features are essential. First, the success posterior μ_{10} is *the same function of the lowest active type in both regimes*: the outcome "one first–period success and nothing thereafter" is produced by every active type $\theta > \bar{\theta}_A$ (in NoIPE all active types exert effort once; in IPE the $(1,0)$–types do so directly, and the conditional types in $(\bar{\theta}_B^I, 1)$ also generate exactly this outcome by succeeding in period 1 and then stopping), so μ_{10} depends only on the set $(\bar{\theta}_A, 1]$ and equals the displayed expression in both cases. Second, the failure posteriors are ordered, as the following lemma shows.

Lemma 1. *For all* $0 < a < b < 1$*,*

$$\mu_{00}^I(a,b) \;<\; \mu_{00}^N(a).$$

Proof. A direct computation gives

$$\mu_{00}^N(a) - \mu_{00}^I(a,b) = \frac{(1-b)^2\,\Pi(a,b)}{6\,(1+a^2)\,(2+3a^2+3b^2-2b^3)},$$

where

$$\Pi(a,b) = 3a^2\big(1+2b+3b^2\big) + \big(1+2b+9b^2\big) - 4a^3\big(1+2b\big).$$

The denominator is positive on $(0,1)^2$ (since $2+3a^2+3b^2-2b^3 = 2+3a^2+b^2(3-2b) > 0$), so it suffices to show $\Pi(a,b) > 0$. As $0 < a < 1$ we have $a^3 < a^2$, hence $4a^3(1+2b) < 4a^2(1+2b)$ and

$$\Pi(a,b) > a^2\big(9b^2-2b-1\big) + \big(1+2b+9b^2\big).$$

If $9b^2-2b-1 \geq 0$ the right-hand side is positive. If $9b^2-2b-1<0$, then since $a<b$ implies $a^2<b^2$ and multiplying a negative number by the larger factor decreases it,

$$\Pi(a,b) > b^2\big(9b^2-2b-1\big) + \big(1+2b+9b^2\big) = 9b^4-2b^3+8b^2+2b+1 > 0.$$

In either case $\Pi(a,b)>0$, which proves the claim (with equality only in the degenerate limit $b=1$). $\square$

Define the NoIPE benefit function

$$B(a) \;\equiv\; a\left[\mu_{10}(a)-\mu_{00}^{N}(a)\right] \;=\; \frac{a\,(4a^2+a+1)}{3\,(1+a)(1+a^2)},$$

so that (A.57) reads $B(\bar{\theta}_A^N)=c$. Differentiating, $B'(a)=\dfrac{3a^4+6a^3+12a^2+2a+1}{3\,(1+a)^2(1+a^2)^2}>0$ on $[0,1]$, with $B(0)=0$ and $B(1)=\frac{1}{2}$; thus B is a strictly increasing bijection from $[0,1]$ onto $[0,\frac{1}{2}]$.

Now apply Lemma 1 with $a=\bar{\theta}_A^I$, $b=\bar{\theta}_B^I$ (legitimate since $0<\bar{\theta}_A^I<\bar{\theta}_B^I<1$). Using $\mu_{00}^I(\bar{\theta}_A^I,\bar{\theta}_B^I)<\mu_{00}^N(\bar{\theta}_A^I)$ in (A.58),

$$c=\bar{\theta}_A^I\big[\mu_{10}(\bar{\theta}_A^I)-\mu_{00}^I\big] > \bar{\theta}_A^I\big[\mu_{10}(\bar{\theta}_A^I)-\mu_{00}^N(\bar{\theta}_A^I)\big] = B(\bar{\theta}_A^I).$$

Hence $B(\bar{\theta}_A^I)<c=B(\bar{\theta}_A^N)$, and strict monotonicity of B gives

$$\bar{\theta}_A^I \;<\; \bar{\theta}_A^N.$$

Substituting into (A.56), both terms are positive, so

$$\Delta(c)=\big(\bar{\theta}_A^N-\bar{\theta}_A^I\big)+\tfrac{1}{2}\big(1-\bar{\theta}_B^I\big)^2>0 \qquad \text{for all } c\in[c_H^I,\tfrac{1}{2}).$$

Thus expected total effort is strictly higher under IPE on the whole high–cost range, establishing the analytic dominance statement of Proposition 3. The mechanism is transparent: the lowest type willing to signal is lower under IPE ($\bar{\theta}_A^I<\bar{\theta}_A^N$, the extensive–margin effect), and in addition the conditional types contribute the positive second–period term $\frac{1}{2}(1-\bar{\theta}_B^I)^2$.

Step 4: NoIPE dominates at small costs

Consider $c \in (0, c_L^I)$, where NoIPE is in its two–threshold regime and IPE in its three–threshold regime. Subtracting the first lines of (A.54) and (A.55),

$$\Delta(c) = \underbrace{\left(\bar{\theta}_A^N + \bar{\theta}_B^N\right) - \left(\bar{\theta}_A^I + \bar{\theta}_B^I\right)}_{\text{cut-off margin}} - \underbrace{\tfrac{1}{2}\left[(\bar{\theta}_C^I)^2 - (\bar{\theta}_B^I)^2\right]}_{\geq 0\ :\ \text{early–stopping loss}} . \tag{A.59}$$

The second term is non-negative (as $\bar{\theta}_C^I \geq \bar{\theta}_B^I$) and records the effort that conditional types forgo by stopping after a first-period success, a possibility that exists only under IPE. This is the force that makes NoIPE the more effort-intensive regime at low costs: when effort is cheap, a large mass of high types would exert effort in *both* periods under NoIPE, whereas under IPE the same types stop after an early success.

Unlike the high-cost range, the comparison here cannot be reduced to a single monotone cut-off relation, because at low cost the cut-off margin in (A.59) and the early-stopping loss are of the same small order and partly offset. The cut-offs solve coupled cubic-quartic indifference systems with no closed-form solution. Evaluating (A.59) on the numerically solved threshold systems gives $\Delta(c) < 0$ for all sufficiently small c, with a gap that vanishes to high order as $c \downarrow 0$; this is why the two total-effort curves are visually indistinguishable at low costs in Figure 3. This numerical evaluation underlies the claim of Proposition 3 that expected total effort is higher under NoIPE at low costs.

Conclusion

Steps 1 and 3 establish the analytic statements of Proposition 3, and Step 4 and this subsection report the numerical findings. Combining these results with the continuity of Δ (Step 2): Δ is negative for small c, positive on $[c_H^I, \frac{1}{2})$, and zero at $c = \frac{1}{2}$, so by the intermediate value theorem Δ has at least one sign change in $(0, \frac{1}{2})$. Solving the threshold systems of Propositions 1–2 numerically shows that the sign change is in fact unique, occurring at

$$c^* \approx 0.135,$$

with $\Delta(c) < 0$ on $(0, c^*)$ and $\Delta(c) > 0$ on $(c^*, \frac{1}{2})$: the two cost ranges of Proposition 3 therefore partition the active region $(0, \frac{1}{2})$, and the IPE-favoring range lies uniformly above the NoIPE-favoring range. The magnitudes are markedly asymmetric: the maximal NoIPE advantage is small, with $\max_c(-\Delta) \approx 0.024$ attained near $c \approx 0.10$, whereas the IPE advantage reaches $\max_c \Delta \approx 0.18$ near $c \approx 0.22$. This asymmetry explains why the two total-effort curves are visually close at low costs and clearly separated at higher costs in Figure 3. In particular, at the experimental cost $c = 0.3$ the model predicts strictly higher total effort under IPE ($\mathcal{E}^{IPE} \approx 0.46$ versus $\mathcal{E}^{NoIPE} \approx 0.36$), consistent with the comparative prediction tested in the experiment. $\square$

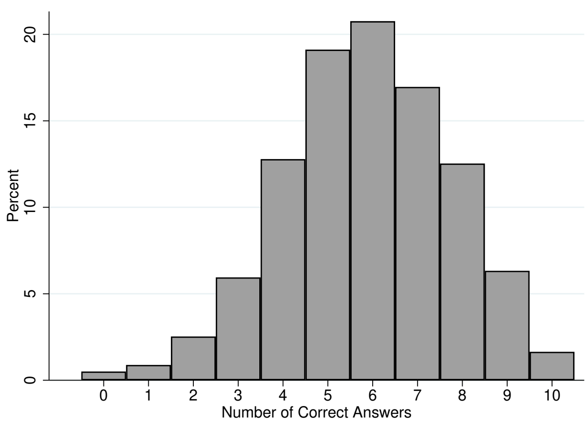
B Further Experimental Results

B1 Answers in Quiz treatments

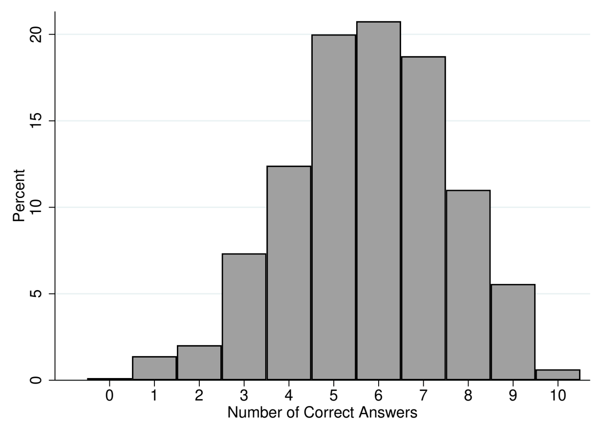
Table B1: Agent's Answers in Quiz

	#Correct Period 1	#Correct Period 2
	(1)	(2)
Agent Type	0.291***	0.193***
	(0.058)	(0.051)
Round	-0.034	-0.027
	(0.022)	(0.020)
IPE	-0.150	-0.195*
	(0.109)	(0.117)
Effort Period 1	0.552**	
	(0.210)	
Effort Period 2		0.472**
		(0.199)
const.	4.331***	4.820***
	(0.319)	(0.310)
Obs.	790	790
Clusters	79	79
R^2	0.152	0.081

Notes: OLS regressions of the number of correct answers in the quiz task in the first period of a round (1) and the second period of a round (2). The maximum of correct answers in a period (and the maximum value of type) is 10, and 10 rounds were played. Standard-errors are clustered at the agent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.



(a) First Period



(b) Second Period

Figure B1: Distribution of number of correct Quiz answers by the agents in the first (a) and second (b) period of a round.

B2 Effort after Success in IPE

Table B2: Second Period Effort after Success (IPE)

	Abstract		Quiz	
	(1)	(2)	(3)	(4)
Type of Agent	0.009***	0.009***	0.087**	0.080**
	(0.002)	(0.002)	(0.034)	(0.036)
Fairness	0.053***	0.050***	-0.017	-0.019
	(0.016)	(0.017)	(0.032)	(0.033)
Math Grade	0.036	0.041	0.071	0.075
	(0.036)	(0.034)	(0.053)	(0.054)
Male		-0.086		0.078
		(0.060)		(0.096)
endogenous		-0.104		-0.062
		(0.099)		(0.073)
const.	-0.384*	-0.275	0.024	0.081
	(0.195)	(0.224)	(0.286)	(0.282)
Obs.	174	165	97	97
Clusters	17	17	16	16
R^2	0.137	0.155	0.147	0.157

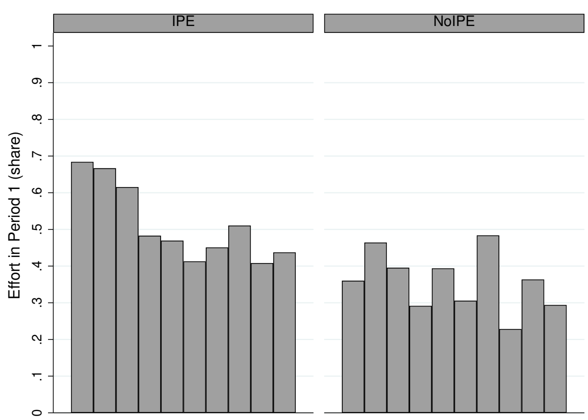
Notes: OLS regressions of the second period effort provision in a round in the Abstract ((1) and (2)) and the Quiz ((3) and (4)) treatments. Only data of agents who were successful in the first period and played in the IPE treatment is used. *Fairness* $\in [1, 7]$ denotes the answer to above mentioned question. *Math Grade* is self reported and ranges from 1 (good) to 6 (bad). *endogenous* denotes the rounds where another principal (instead of the computer) chose whether IPE is played. *Male* is a dummy for the participant's self-reported gender. Participants who stated to not be either male or female are excluded from columns (2) and (4). Standard-errors are clustered at the matching-group level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

B3 Behavior over Time

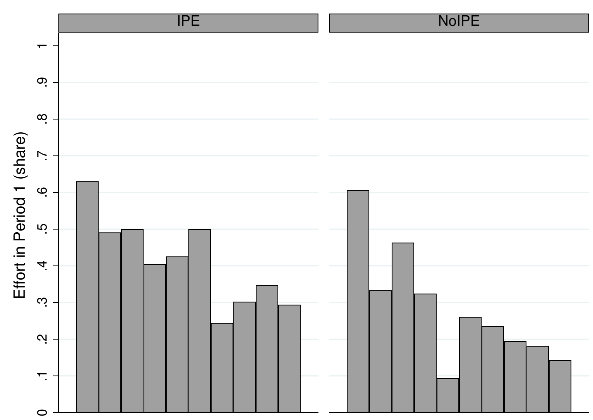
Table B3: Observers' Beliefs about Agent's Type

	Abstract				Quiz			
	SS	SN	NS	NN	SS	SN	NS	NN
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Round	0.614*	0.144	-0.178	0.056	-0.056*	-0.055*	-0.079***	0.050*
	(0.318)	(0.203)	(0.216)	(0.295)	(0.028)	(0.028)	(0.027)	(0.028)
const.	59.701***	49.797***	52.157***	33.940***	6.267***	5.418***	5.651***	4.341***
	(2.511)	(1.592)	(1.623)	(2.017)	(0.254)	(0.193)	(0.166)	(0.185)
Obs.	820	820	820	820	790	790	790	790
Clusters	82	82	82	82	79	79	79	79
R^2	0.005	0.001	0.001	0.000	0.003	0.006	0.013	0.003

Notes: OLS regressions of the observers' beliefs for the different possible success occurrences. Standard-errors are clustered at the principal level. Clustering standard-errors at the matching group level or including observer fixed effects does not change the results qualitatively. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

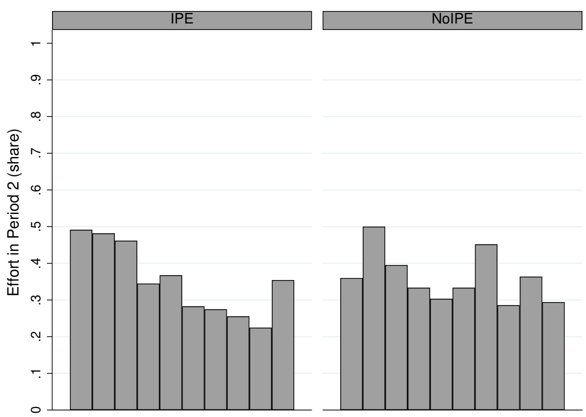


(a) Abstract Treatments

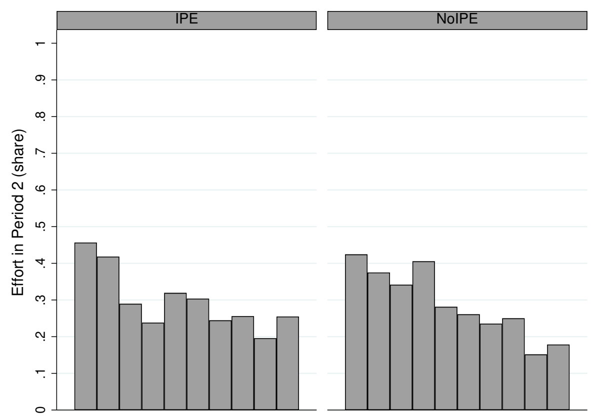


(b) Quiz Treatments

Figure B2: First period effort provision over time.



(a) Abstract Treatments



(b) Quiz Treatments

Figure B3: Second period effort provision over time.

B4 Explanation for IPE Choice of Principals

In the post-experimental questionnaire, principals answered the non-incentivized free-form question: *"What motivated your decision whether Player A receives feedback about the success in period 1?"*. In Table B4, I provide translations of all non-empty answers, sorted into categories that seem to stand out. For some answers, the categorization is debatable. For this reason, I transparently provide the verbatim content in translation, and not just counts by category based on my own judgment.

Table B4: Principal's Answers to Open IPE-Choice Question

Context	**Participant's answer about motivation to (not) provide feedback**
Category: IPE is better for Agent	
Quiz	I thought that if member A receives feedback and learns that there was no success, he or she might not be willing to invest the 30 points.
Quiz	I thought that if member A gets no information, the probability is higher that he or she will keep paying for success.
Quiz	I thought it was only fair to inform member A in every round (1 to 5) about the success in period 1.
Quiz	I found no reason for the decision, so I always decided that member A should receive feedback.
Quiz	I saw hardly any point here; I always let A know about success because I support information sharing.
Quiz	I always chose feedback because it seemed like the better option and had no effect on my payoff.
Quiz	I found it fair that A receives my assessment.
Quiz	In the end it did not matter; the other person could also learn that they had, of course, not been successful.
Quiz	There is no reason, neither for A nor for me, to withhold the feedback. One could say that, since the As were usually so bad and perhaps did not realize it, B might have an advantage in letting them believe they still had a chance, so that they pay the 30 points and B has a chance as well, but anyway.

Table B4: Principal's Answers to Open IPE-Choice Question (continued)

Context	**Participant's answer about motivation to (not) provide feedback**
Quiz	I am a curious person myself and would want to know how I performed. So I transferred this to the other person.
Quiz	I always chose feedback because I think member A can recognize in this way whether the answer was wrong or correct and then make fewer mistakes afterwards.
Quiz	So that A can better assess in the second period whether period 2 is likely to lead to success or not.
Quiz	I always preferred feedback because then member A can adjust the decision of whether to invest the 30 points accordingly.
Quiz	I always chose feedback because I personally would have wanted it that way if I had been A.
Quiz	I thought he should always receive feedback so that he can assess how to proceed.
Abstract	I always allowed feedback because I think that with feedback A has more information to judge whether it is worth investing in the next period. In a sense, this gives an additional probability assessment. Perhaps it increases the investment rate.
Abstract	I usually made feedback visible to member A. I think it would have been more worthwhile for member A to try to achieve success in at least one of the rounds. If I had been member A, I would only have paid the cost in the second round if I had known that I had had no success in the first round despite a high type percentage. Therefore I wanted member A to receive feedback.
Abstract	A would surely like to be informed about it.
Abstract	Since a new person was assigned each time, I automatically chose feedback. The more information, the more precise the assessment of the chances of success can be.
Abstract	If he or she had more information, he or she could make better decisions. Therefore always with feedback.
Abstract	I thought that I myself would also like to know the feedback, which is why I almost always decided to communicate it.

Table B4: Principal's Answers to Open IPE-Choice Question (continued)

Context	Participant's answer about motivation to (not) provide feedback
Abstract	I always chose that he receives feedback so that he knows whether his strategy worked or whether he should proceed differently.
Abstract	Information is always helpful, so I generally allowed feedback. Whether this affected player A's decision, I cannot judge.
Category: IPE is (not) better for Principal	
Quiz	No feedback → higher chance that more periods are played, even if only marginally.
Quiz	I wanted it so that it would weigh in favor of success.
Quiz	At first I thought feedback is good, so the person can also choose the chance in the second round, but then I thought it could also be discouraging if someone sees they had no success. So I experimented a bit and tried both, since the partners changed anyway.
Quiz	I hoped for higher chances of success this way, also for A through direct feedback.
Quiz	I wrote down how the participants decided and acted more or less intuitively.
Quiz	I gave feedback only in the first round; after that I wanted to continue without it.
Quiz	In the first five rounds I had the impression that I received more points when A did not get feedback.
Quiz	I always gave feedback so that the people can see how bad they are at answering quiz questions.
Abstract	I consistently chose no feedback because all A-participants had decided terribly anyway.
Abstract	In favor of feedback, because then period 2 will probably still be paid for if no success occurs, so that there is at least one success overall.
Abstract	With feedback, A is less willing to pay for the chance.
Abstract	Better adjustment of my own estimate.
Abstract	Since if member A succeeds, then I do as well. If one receives information, there is a better chance of finding the "right" solution.

Table B4: Principal's Answers to Open IPE-Choice Question (continued)

Context	Participant's answer about motivation to (not) provide feedback
Abstract	I felt that if member A receives feedback, he or she is more likely to invest, so I often selected feedback.
Abstract	If successful, then more willing to bet on success again in round 2.
Abstract	I usually gave feedback because it increased the chance that the 30 points would be paid in the second stage.
Abstract	Generally positive feedback so that A is also motivated to invest for success.
Abstract	I gave A feedback four times because I thought it might motivate A to invest the 30 points again in period 2 if A sees that period 1 was already successful. The one time I decided against feedback, I simply wanted to test what effect that would have on the outcome.
Abstract	I thought it was only fair and hoped to increase the probability of success that way, because teamwork makes the dream work and all that.
Abstract	I thought that if A received feedback, A would be less willing to take risks if A had unsuccessfully paid the 30 points in period 1. It was in my interest that A pays the 30 points whenever possible, so I did not want A to see the feedback.
Abstract	So that he sees from a decision not to invest that I assign 0 points to it.
Abstract	Previous results; possible motivators.
Abstract	On member A's success.
Abstract	Two times yes, more often no, without better winning chances.
Category: Random / no clear strategy / intuition	
Quiz	Gut feeling.
Quiz	Nothing.
Quiz	Nothing in particular.
Quiz	I had no strategy.
Quiz	Random.
Quiz	Whether it makes a difference.
Quiz	In fact, I regarded this as unimportant.

Table B4: Principal's Answers to Open IPE-Choice Question (continued)

Context	Participant's answer about motivation to (not) provide feedback
Abstract	Nothing.
Abstract	That was rather random, since I did not see higher or lower chances of success with or without feedback.
Abstract	Just like my answer to the previous question.
Abstract	Just like that.
Abstract	I gave feedback randomly, and I think one really could not do much with feedback.
Abstract	I still do not know whether feedback made any difference at all, so I just did it randomly.
Abstract	To be honest, I could not think of anything that spoke for or against feedback, so I decided relatively randomly in favor of feedback.
Abstract	It depended somewhat on the round payoff; otherwise I simply decided arbitrarily whether with or without feedback.
Abstract	Pure chance principle.
Category: Always (or almost always) feedback	
Quiz	Always feedback.
Quiz	I always let the person receive feedback.

Supplementary Material

A Decision Screens

Translations of the German texts (from top to bottom of each screen) are provided in the figure notes.

A1 Abstract Treatments

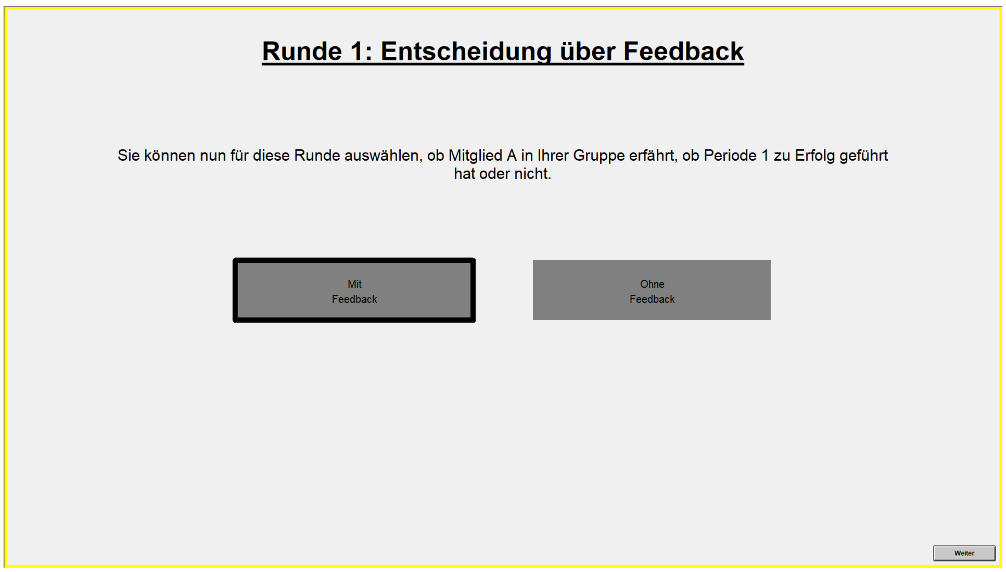


Figure A1: Endogenous Treatment, Principal.

Notes: "Round 1: Decision about Feedback. You can choose for this round, whether Member A of your group learns whether or not Success was achieved in Period 1. With feedback. Without feedback."

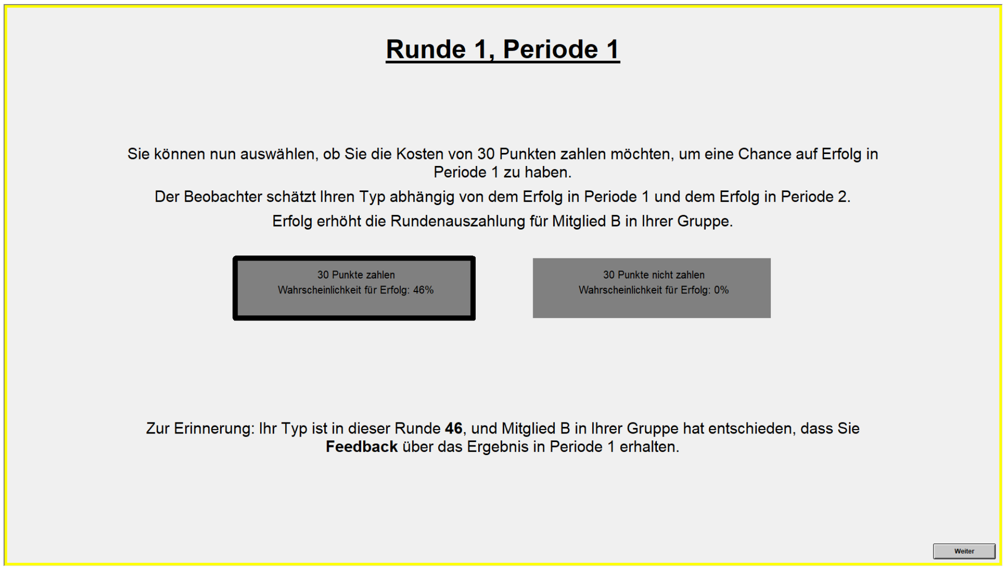


Figure A2: Endogenous Treatment, Agent.

Notes: "Round 1, Period 1. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 1. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: 48%. Not paying 30 points. Probability for Success: 0%. Reminder: In this round your type is 46, and Member B of your Group decided, that you receive feedback about the Success in Period 1."

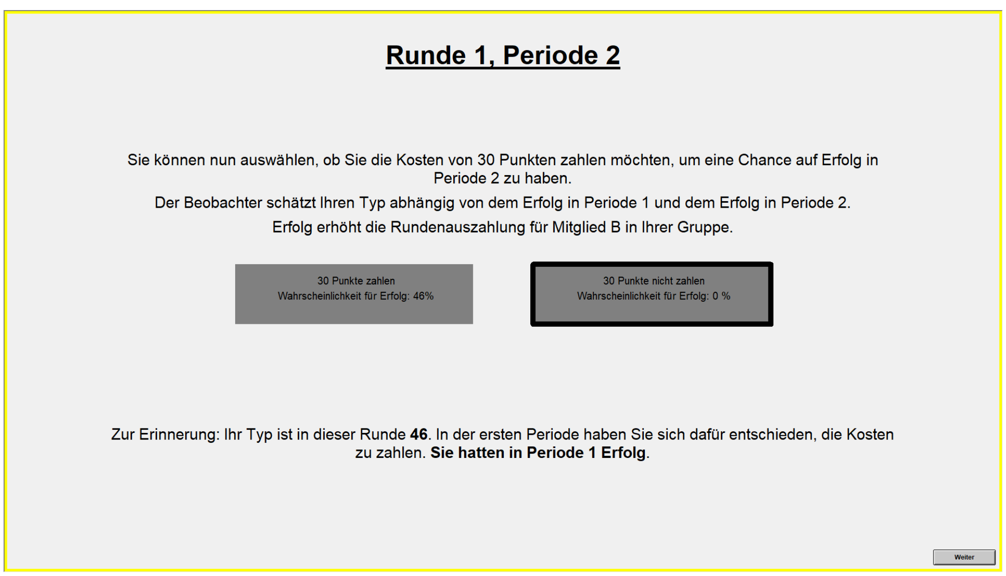


Figure A3: IPE treatment, Agent.

Notes: "Round 1, Period 2. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 2. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: 48%. Not paying 30 points. Probability for Success: 0%. Reminder: In this round your type is 46. You decided to pay the costs in the first Period. You had Success in the first Period."

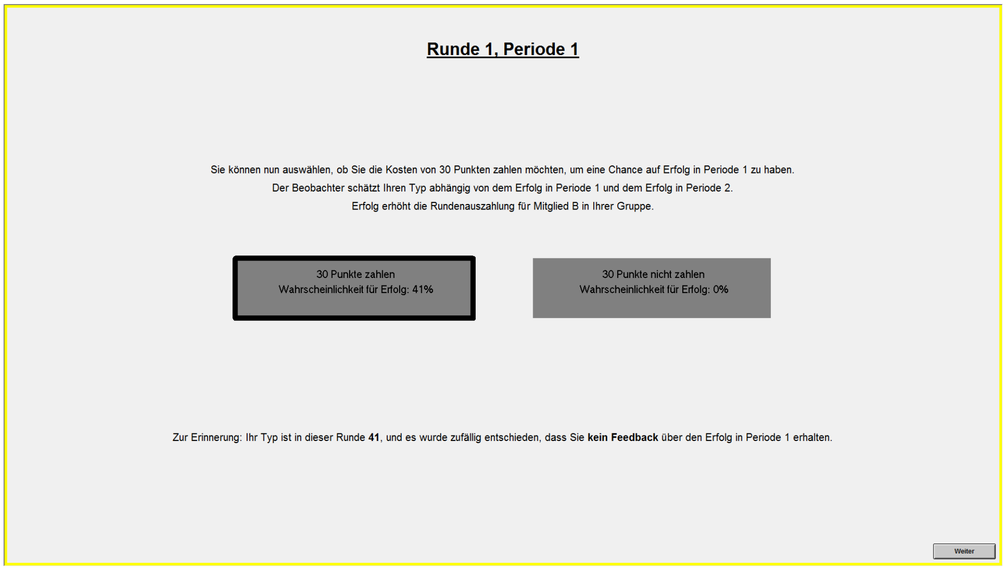


Figure A4: Exogenous Treatment, Agent.

Notes: "Round 1, Period 1. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 1. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: 41%. Not paying 30 points. Probability for Success: 0%. Reminder: In this round your type is 41, and it was randomly determined that you receive no feedback about the Success in Period 1."

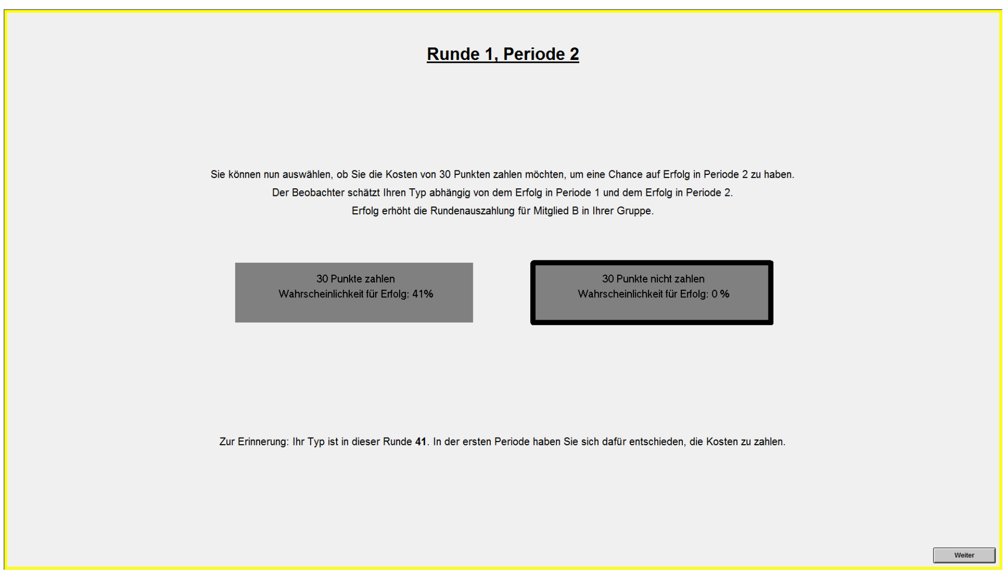


Figure A5: NoIPE Treatment, Agent.

Notes: "Round 1, Period 2. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 2. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: 41%. Not paying 30 points. Probability for Success: 0%. Reminder: In this round your type is 41. You decided to pay the costs in the first Period."

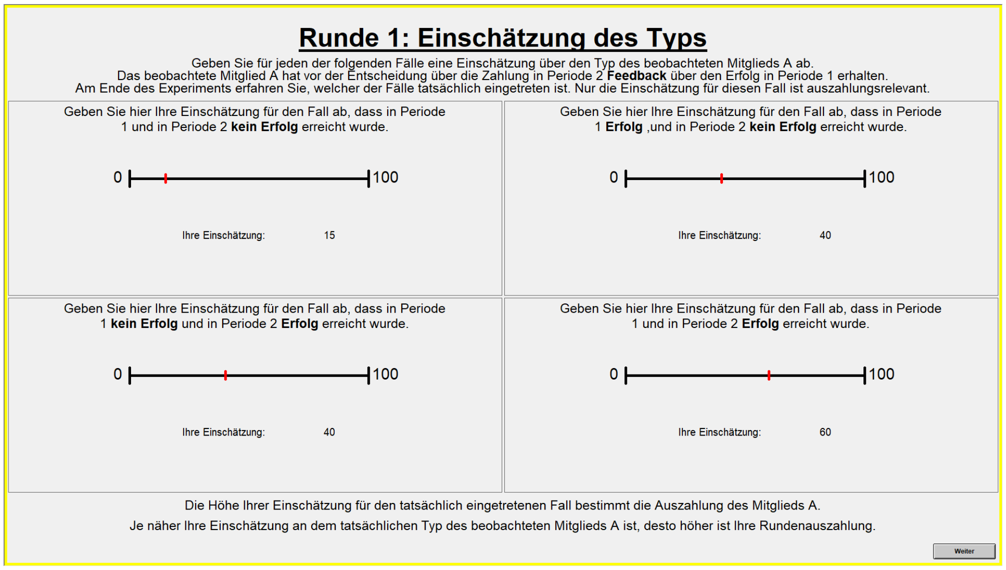


Figure A6: Observer.

Notes: "Round 1: Type Assessment. Enter for each of the following cases an estimate about Member A's type. The observed Member A received Feedback about the Period 1 Success prior to the decision whether to pay in Period 2. At the end of the experiment you will learn which of the cases indeed occurred. Only the assessment for this case is payoff-relevant. Enter your assessment for the case that no Success was achieved in Period 1 and Period 2. Your Assessment: 15. Enter your assessment for the case that no Success was achieved in Period 1 and Success was achieved in Period 2. Your Assessment: 40. Enter your assessment for the case that Success was achieved in Period 1 and no Success was achieved in Period 2. Your Assessment: 40. Enter your assessment for the case that Success was achieved in Period 1 and Period 2. Your Assessment: 60. The level of your assessment for the relevant case determines the payoff of Member A. The closer your assessment to the true type of the observed Member A, the higher is your round payoff."

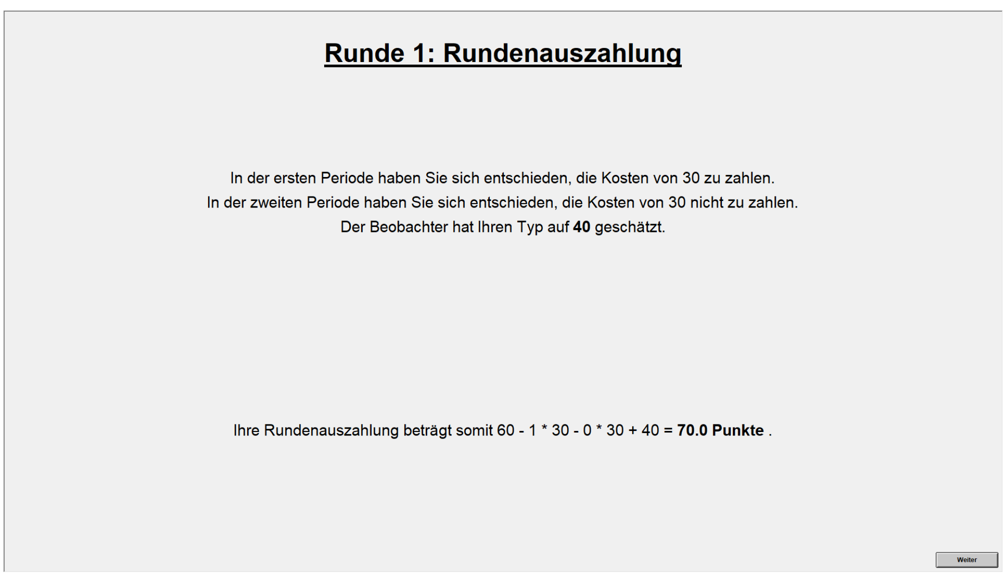


Figure A7: Agent.

Notes: "Round 1: roundpayoff. In the first period you decided to pay the costs of 30. In the second Period you decided not to pay the costs of 30. The observer estimated your type to be 40. Your roundpayoff is therefore: $60 - 1 * 30 - 0 * 30 + 40 = 70$ Points."

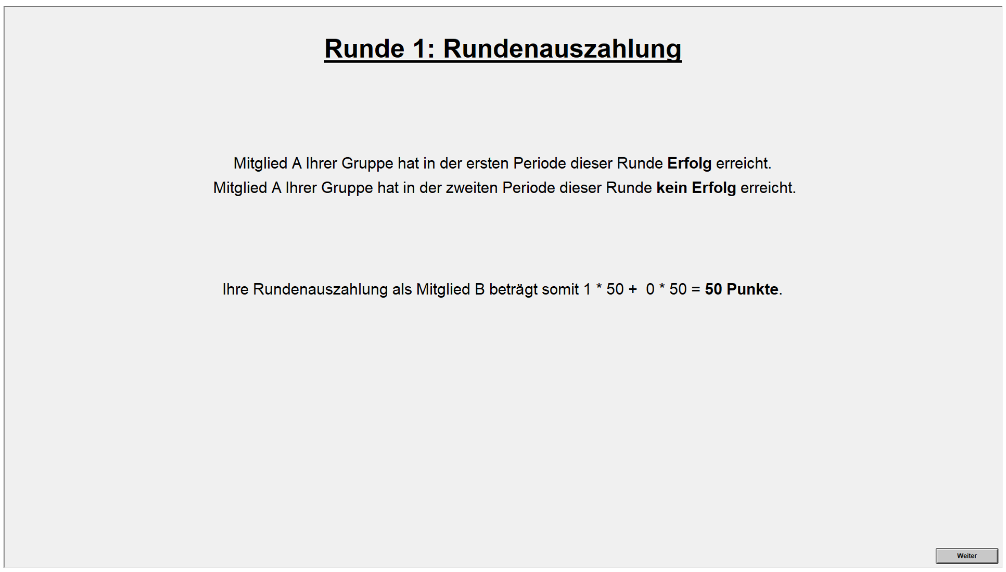


Figure A8: Principal.

Notes: "Round 1: Roundpayoff. Member A in your Group achieved Success in the first Period of this round. Member A of your group achieved no Success in the second Period of this round. Your roundpayoff as Member B is therefore: $1 * 50 + 0 * 50 = 50$ Points."

A2 Quiz Treatments

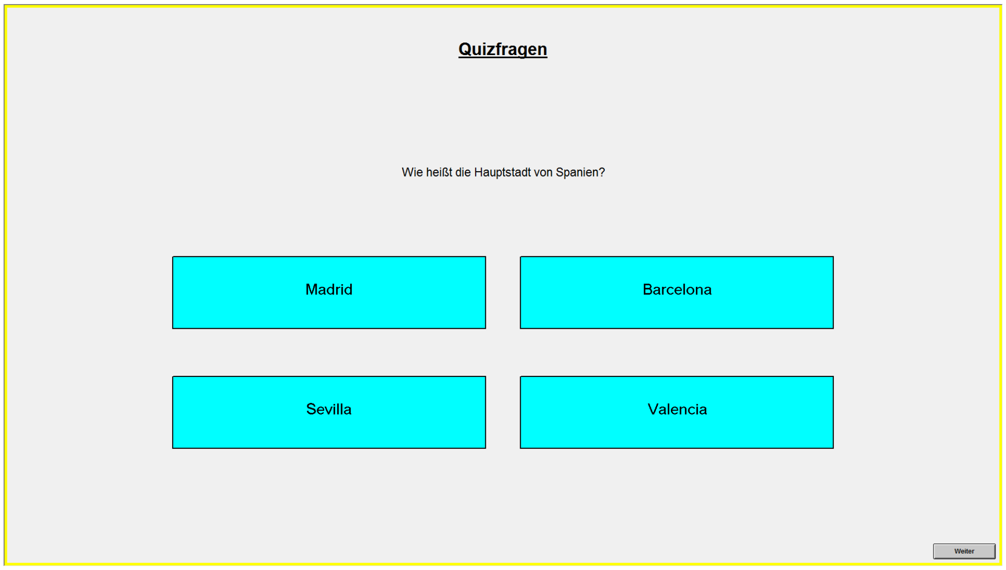


Figure A9: Quiz questions.

Notes: "What is the capital of Spain? Madrid. Barcelona. Sevilla. Valencia."

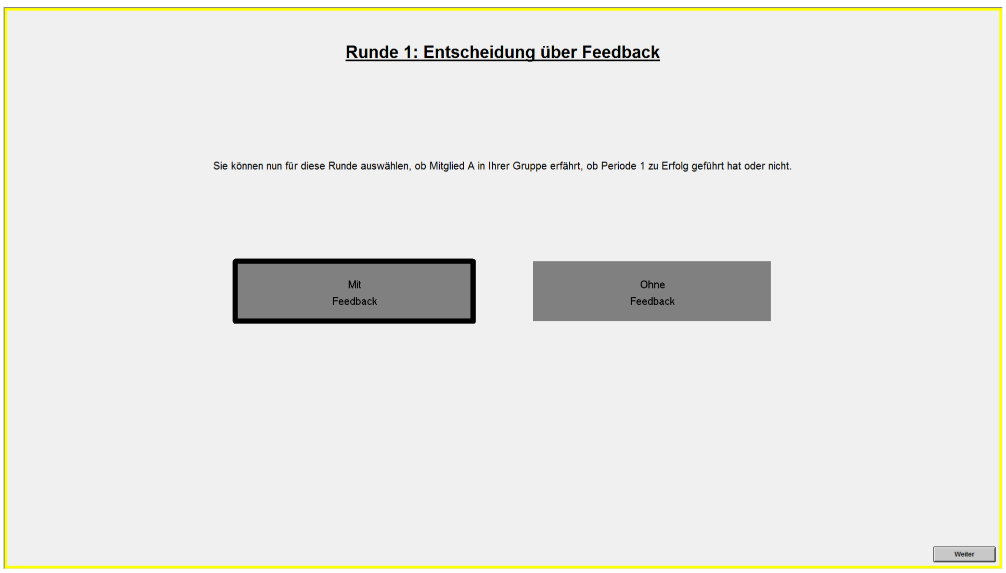


Figure A10: Endogenous treatments, Principal.

Notes: "Round 1: Decision over feedback. You can now choose for this round whether member A from your group learns whether period 1 resulted in success or not. With feedback. Without feedback."

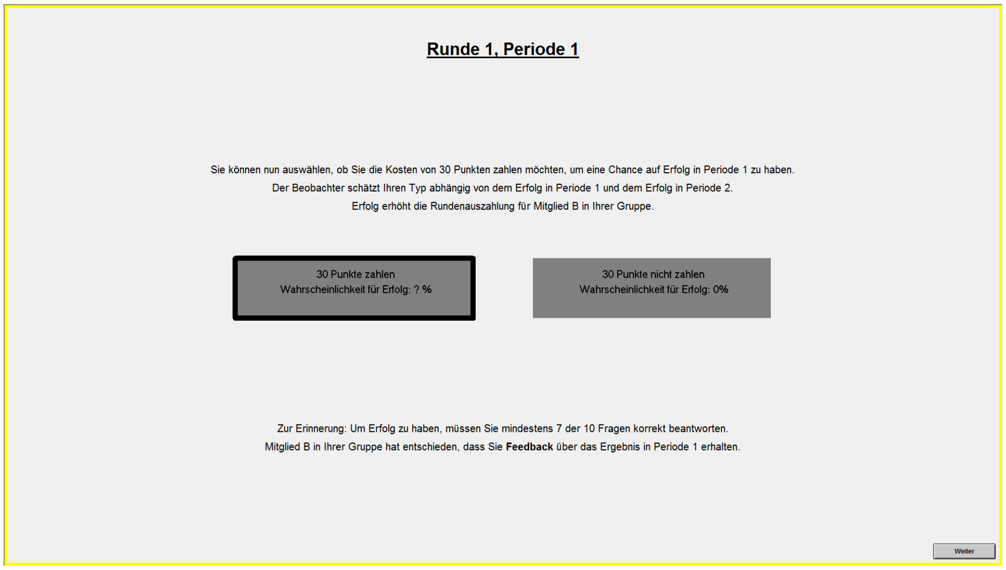


Figure A11: Endogenous treatments, Agent.

Notes: "Round 1, Period 1. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 1. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: ?%. Not paying 30 points. Probability for Success: 0%. Reminder: In order to have success, you need to correctly answer at least seven out of the 10 questions. Member B of your group determined that you receive feedback about the result in Period 1."

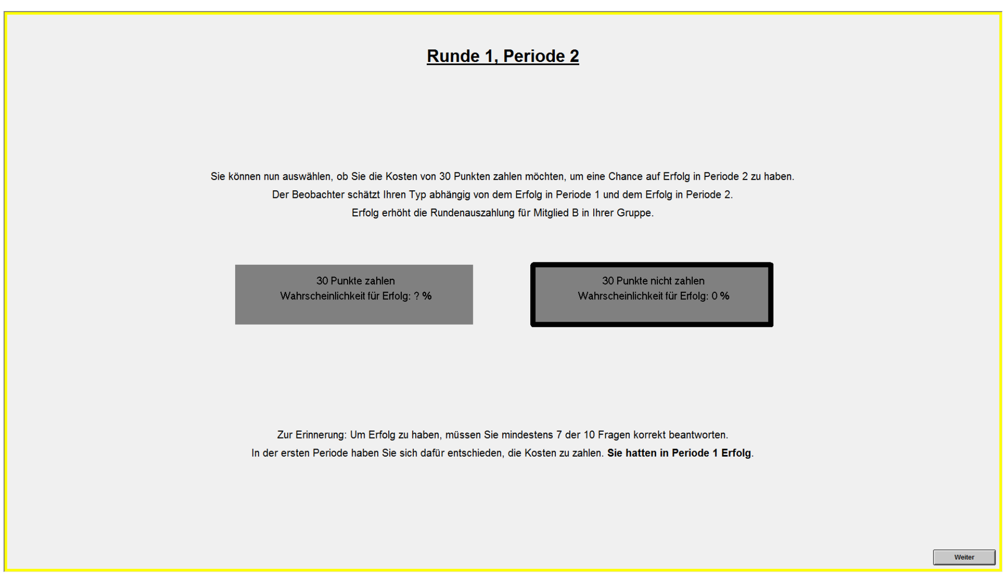


Figure A12: IPE treatment, agent.

Notes: "Round 1, Period 2. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 2. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: ?%. Not paying 30 points. Probability for Success: 0%. Reminder: In order to have success, you need to correctly answer at least seven out of the 10 questions. You decided to pay the costs in the first Period. You had Success in period 1."

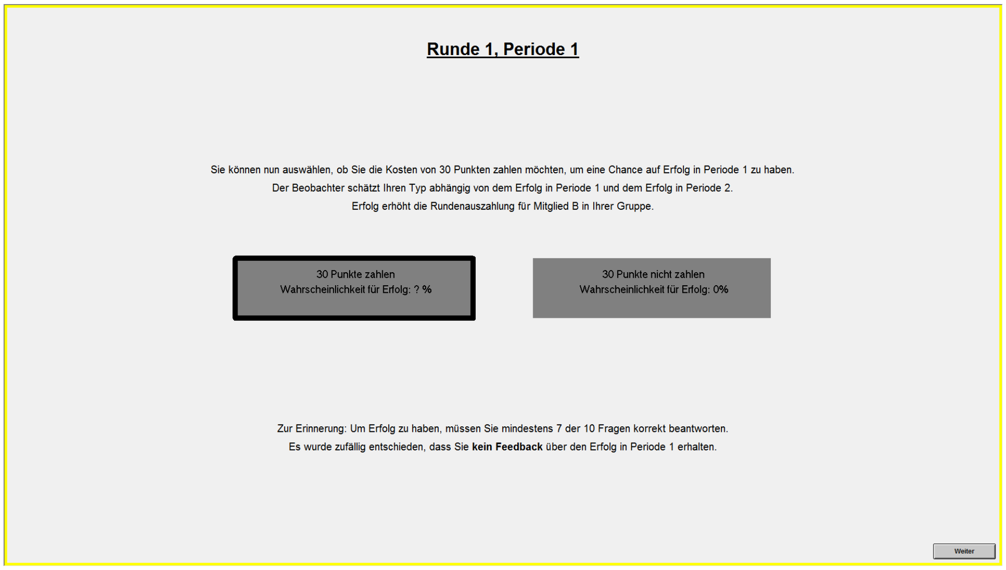


Figure A13: Exogenous treatments, Agent.

Notes: "Round 1, Period 1. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 1. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: ?%. Not paying 30 points. Probability for Success: 0%. Reminder: In order to have success, you need to correctly answer at least seven out of the 10 questions. It was randomly determined that you receive no feedback about the success in Period 1."

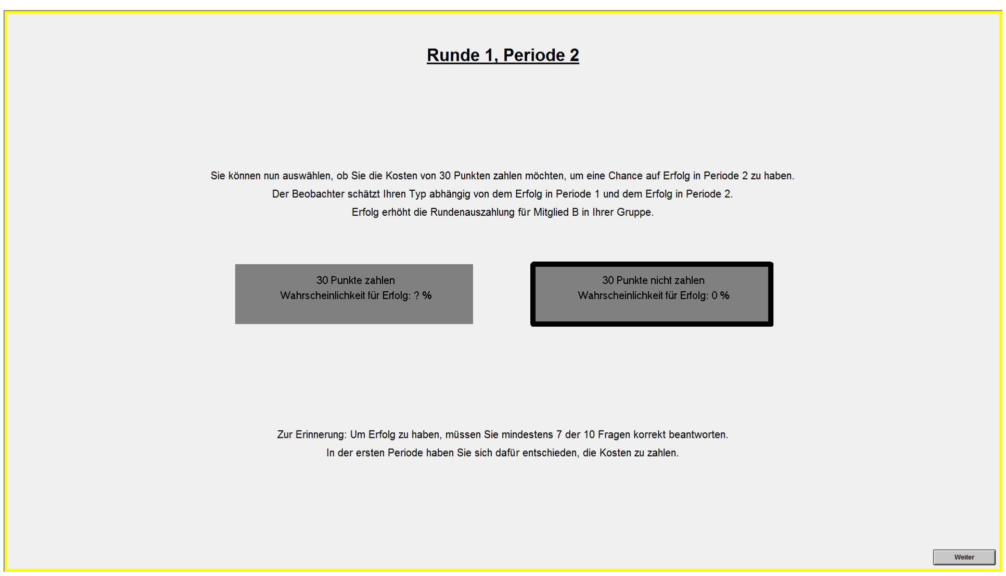


Figure A14: NoIPE, Agent.

Notes: "Round 1, Period 2. You can now choose whether you want to pay the costs of 30 points in order to have a chance for Success in Period 2. The observer guesses your type dependent on your Success in Period 1 and your Success in Period 2. Success increases the roundpayoff of Member B of your group. Paying 30 points. Probability for Success: ?%. Not paying 30 points. Probability for Success: 0%. Reminder: In order to have success, you need to correctly answer at least seven out of the 10 questions. You decided to pay the costs in the first Period."

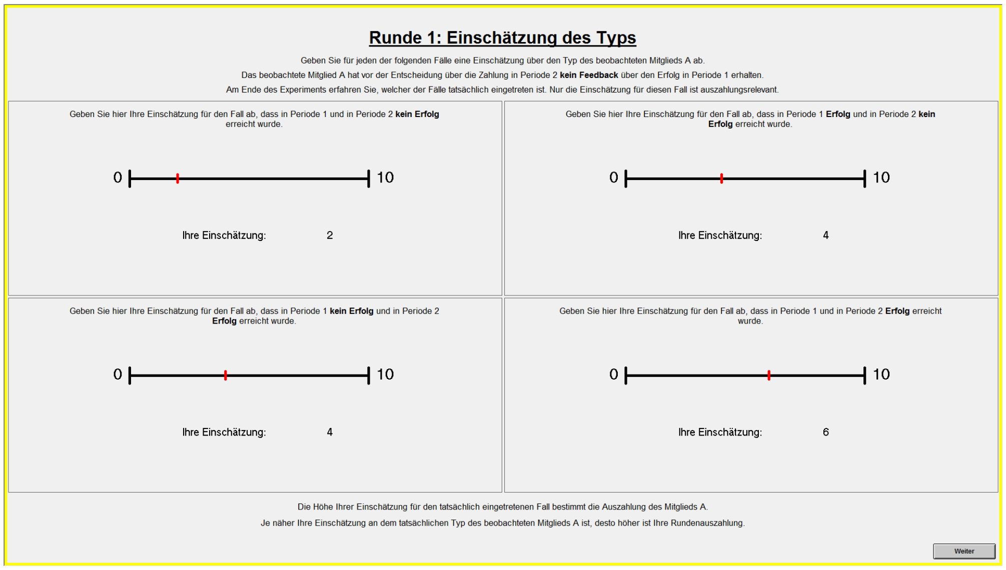


Figure A15: Observer.

Notes: “Round 1: Type Assessment. Enter for each of the following cases an estimate about Member A’s type. The observed Member A received no Feedback about the Period 1 Success prior to the decision whether to pay in Period 2. At the end of the experiment you will learn which of the cases indeed occurred. Only the assessment for this case is payoff-relevant. Enter your assessment for the case that no Success was achieved in Period 1 and Period 2. Your Assessment: 2. Enter your assessment for the case that no Success was achieved in Period 1 and Success was achieved in Period 2. Your Assessment: 4. Enter your assessment for the case that Success was achieved in Period 1 and no Success was achieved in Period 2. Your Assessment: 4. Enter your assessment for the case that Success was achieved in Period 1 and Period 2. Your Assessment: 6. The level of your assessment for the relevant case determines the payoff of Member A. The closer your assessment to the true type of the observed Member A, the higher is your round payoff.”

Figure A16: Agent.

Notes: “Round 1: Roundpayoff. In the first period you decided to pay the costs of 30. In the second Period you decided not to pay the costs of 30. The observer estimated your type to be 4. Your roundpayoff is therefore: $60 - 1 * 30 - 0 * 30 + 10 * 4 = 70$ Points.”

Figure A17: Principal.

Notes: "Round 1: Roundpayoff. Member A in your Group achieved Success in the first Period of this round. Member A of your group achieved no Success in the second Period of this round. Your roundpayoff as Member B is therefore: $1 * 50 + 0 * 50 = 50$ Points."

B Experimental Instructions

An English translation of the Instructions for the Quiz treatments (endogenous IPE first) as well as for the Abstract treatments (exogenous IPE first) is provided. The instructions of the other treatments (Quiz, exogenous IPE first; Abstract, endogenous first) are very similar and omitted here. The original German instructions are part of the replication material.

A1 Quiz Treatment

Overview

Welcome to this experiment. We ask you not to speak with other participants during the experiment and to switch off your mobile phones and other mobile electronic devices.

For participating in today's session, the amount you earn will be paid out to you in cash at the end of the experiment. The size of the payment depends partly on your decisions, partly on the decisions of other participants, and partly on chance. It is therefore important that you carefully read and understand the instructions before the experiment begins.

In this experiment, every interaction between participants takes place via the computers in front of which you are seated. You will interact with each other anonymously and your decisions will only be stored together with your random ID number. Neither your name nor the names of other participants will be revealed, neither today nor in future written analyses.

Today's session consists of several rounds. At the end, a total of 2 or 3 rounds will be randomly selected and paid out. The rounds that are not selected will not be paid. Your payment amount results from the points earned in the selected rounds, converted into euros, as well as your show-up fee of 6 euros. The conversion of points into euros is as follows: Each point is worth 4 cents, so that:

$$25 \text{ Points } = 1 \text{ Euro}$$

Each participant will be paid privately so that other participants cannot see how much you have earned.

Experiment

The experiment consists of two parts with a total of 10 rounds. The rounds within Parts 1 (Rounds 1–5) and 2 (Rounds 6–10) are identical in structure. The instructions for the second part will be provided after the completion of the first part.

At the beginning of the experiment, you will be randomly assigned either the role of **Member A** or **Member B / Observer**. Each participant keeps this role for the entire experiment.

The Group

In the first round, you will be assigned to a large group of 8, 10, or 12 members. At the beginning of each round, two participants from your respective large group will be randomly selected to form a group in that round. Each group consists of one Member A and one Member B. The members of a group are therefore randomly reassigned in every round.

General Structure of a Round

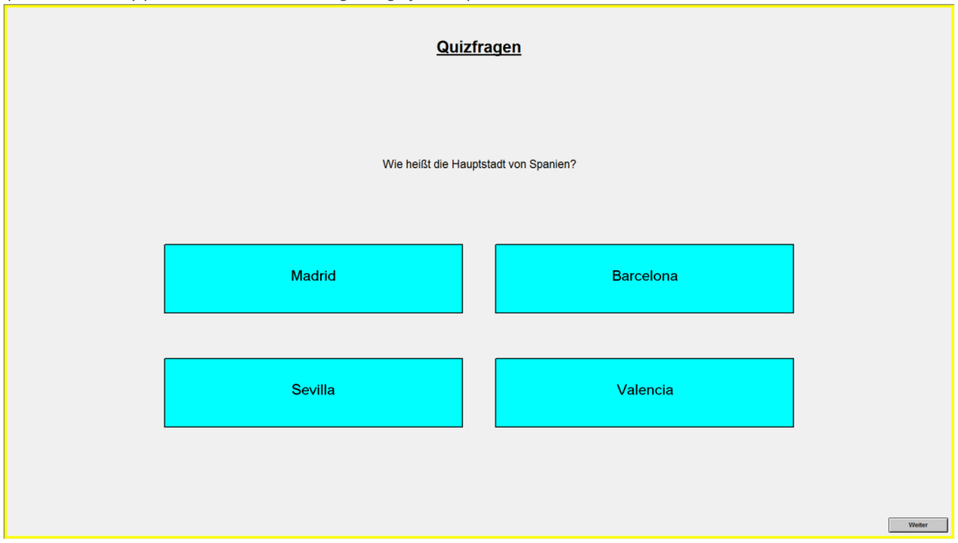
Each round consists of two periods. In each period, each Member A answers 10 quiz questions about the capital city of randomly selected countries. Before Member A sees the questions, they decide whether to pay a cost of 30 points in order to have a chance of success in that period. Success occurs if the cost of 30 points is paid and at least 7 out of the 10 questions are answered correctly. Success in a period determines the payoff of Member B in the respective group. At the end of a round, an observer estimates, based on the successes of this Member A in that round, how many questions this Member A answered correctly at the beginning of the experiment. This estimate determines the round payoff of Member A.

Member A

At the beginning of the experiment, each member answers 10 questions about the capital cities of countries (see Figure 1). The countries asked about are randomly selected for each member, with each of the 194 possible countries being equally likely. The number of correctly answered questions determines the type of Member A in this experiment (a number between 0 and 10). Member A keeps this type for the entire experiment. Member B in the respective group does not learn the type of Member A.

Member A starts each round with a budget of 60 points.

Figure 1: Example image of a randomly selected quiz question. Each Member A answers 10 such randomly selected questions in every period and once at the beginning of the experiment..



In each round, Member A must make two decisions (see Figures 2 and 3):

1. Whether to pay a cost of 30 points in the first period in order to have a chance of success in the first period.
2. Whether to pay a cost of 30 points in the second period in order to have a chance of success in the second period.

After each choice of whether to pay the 30 points in order to have a chance of success, Member A again answers 10 questions about the capital cities of randomly selected countries. Success means answering at least 7 of the 10 questions correctly. If Member A decides not to pay the cost of 30 points in a period, success in that period cannot occur, regardless of how many questions are answered correctly. If Member A decides to pay the cost of 30 points in a period, the member has success if at least 7 of the 10 following questions are answered correctly. If fewer than 7 questions are answered correctly, there is no success. No other participant learns whether Member A decided to pay the cost.

Success in a period increases the round payoff of Member B in the same group. An observer (a Member B from another group) provides, depending on the success outcomes in a round, an estimate of how many questions this Member A answered correctly at the beginning of the experiment. This estimate determines the round payoff of Member A: the higher the estimate given by Member B, the higher the round payoff of Member A.

Figure 2: Example image of Member A's decision whether to pay 30 points in the first period in order to have a chance of success in the first period. In this example, Member B of the same group has decided that Member A receives feedback about the success of Period 1.

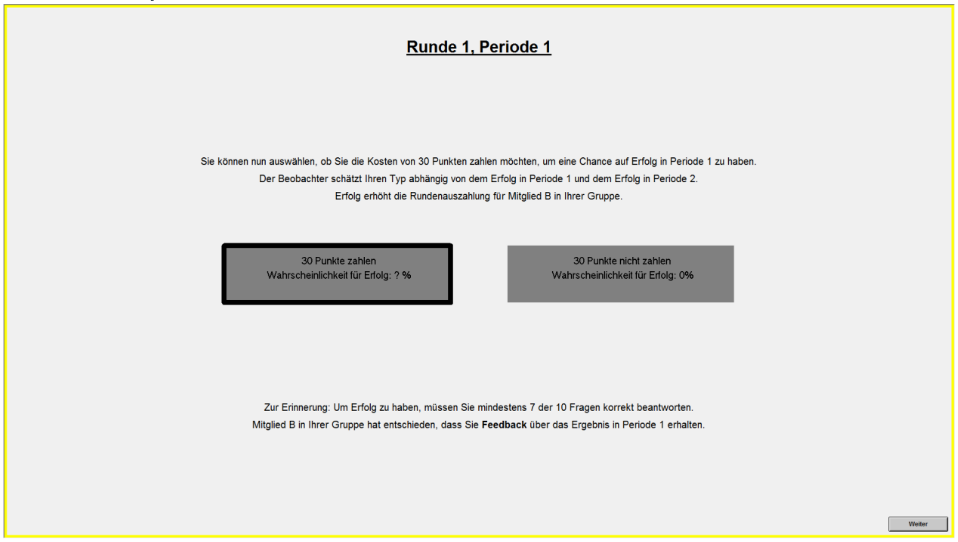
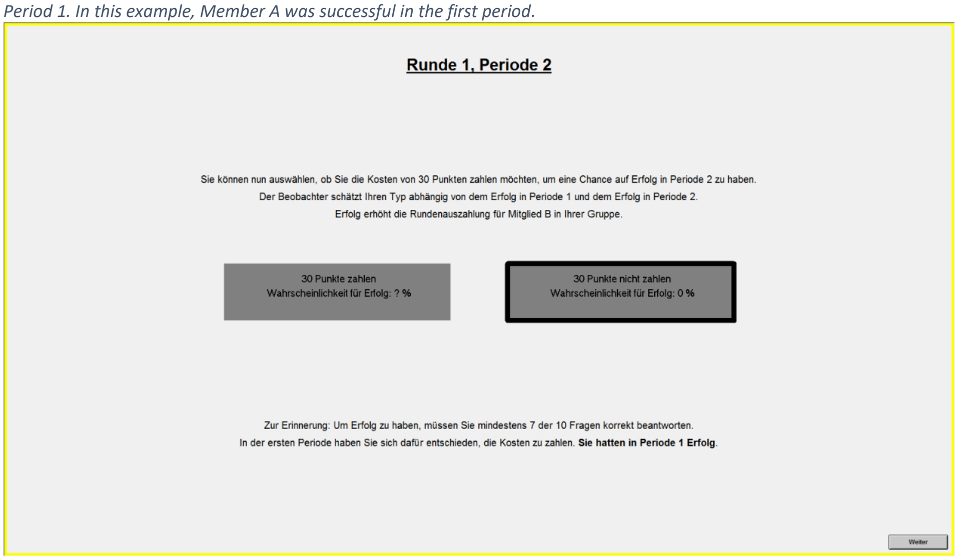


Figure 3: Example image of Member A's decision whether to pay 30 points in the second period in order to have a chance of success. In this example, Member B of the same group has decided that Member A receives feedback about the success of Period 1. In this example, Member A was successful in the first period.

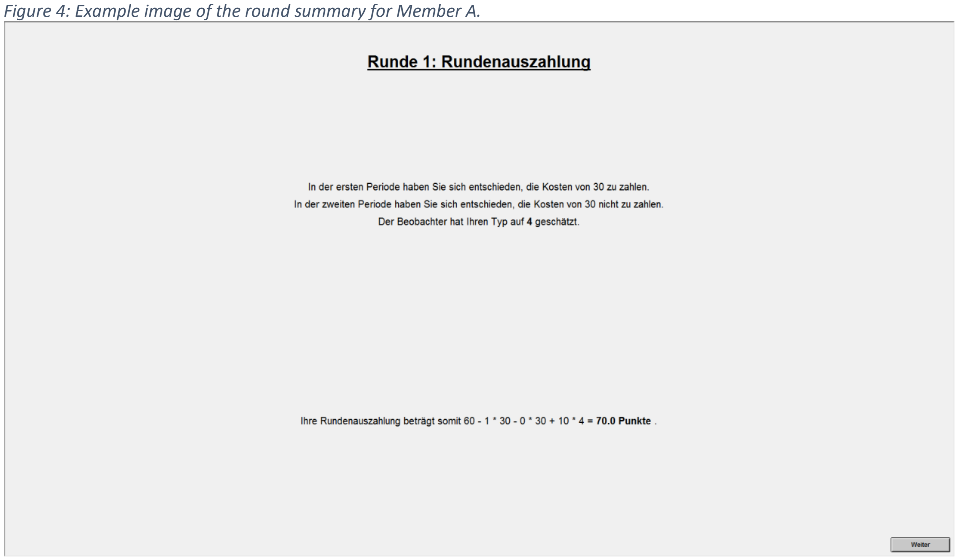


The payoff of Member A in a round is therefore

- $60\ (starting\ endowment) +\ 10 *\ estimate\ of\ the\ observer$, if Member A decided not to pay the 30 points for chances of success in either period.
- $60\ (starting\ endowment) - 30\ (payment\ for\ chance\ of\ success\ in\ one\ period) +$ $10 *\ estimate\ of\ the\ observer$, if Member A decided to pay the 30 points for chances of success in one of the two periods.
- $60\ (starting\ endowment) - 60\ (payment\ for\ chance\ of\ success\ in\ one\ period) +$ $10 *\ estimate\ of\ the\ observer$, if Member A decided to pay the 30 points for chances of success in both periods.

Example: A Member A decides not to pay the 30 points for a chance of success in the first period. In the second period, Member A decides to pay the 30 points for a chance of success. The observer estimates the type of Member A to be 6 if no success occurred in the first period and success occurred in the second period (the observer therefore estimates that this Member A answered 6 out of 10 questions correctly at the beginning of the experiment). Furthermore, the observer estimates the type of Member A to be 3 if no success occurred in either of the two periods of the current round (the observer therefore estimates that this Member A answered 3 out of 10 questions correctly at the beginning of the experiment). If Member A answers at least 7 of the 10 questions correctly in the second period, the payoff is: 60 - 30 + 60 = 90 points, and if fewer than 7 questions are answered correctly, the payoff of Member A is 60 - 30 + 30 = 60 points.

Figure 4: Example image of the round summary for Member A.



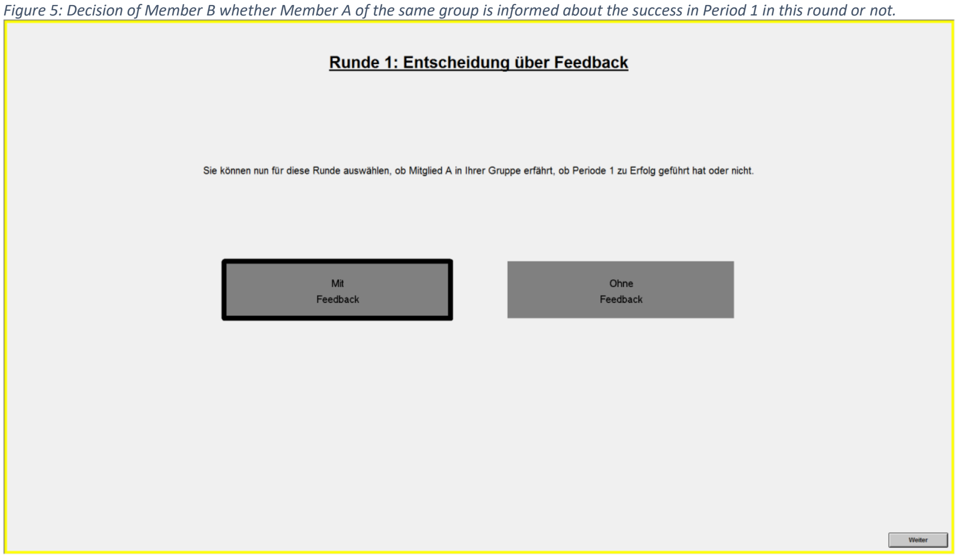
Member B / Observer of another group

Member B also answers 10 randomly selected quiz questions at the beginning of the experiment in order to get an impression of the difficulty of the questions. Afterwards, Member B learns how many of the 10 questions were answered correctly.

At the beginning of each round, Member B decides whether Member A of the same group receives feedback about success in the first period or not (see Figure 5). This determines whether Member A of the same group, after deciding whether to pay 30 points in the first period but before making the decision for Period 2, learns whether success occurred in Period 1 or not.

At the end of each round, Member B of the group receives 50 points for each success of Member A of the same group. If Member A therefore has success in both periods of a round, the round payoff of Member B is 100 points. If Member A has success in only one period, the round payoff of Member B is 50 points. If Member A has no success in both periods, the round payoff of Member B is 0 points. Member B never learns whether Member A of the same group paid 30 points in a period in order to have a chance of success or not.

Figure 5: Decision of Member B whether Member A of the same group is informed about the success in Period 1 in this round or not.



As an **observer**, a Member B observes the Member A of another group. Here, the observer provides an estimate of the type of Member A for each possible success outcome (see Figure 6).

The payoff for the observer is as follows:

$$Round\ payoff\ =\ 100\ -10 *\ |submitted\ estimate - actual\ type\ of\ Member\ A|$$

The closer the observer's estimate is to the true type of Member A, the higher the observer's round payoff. The estimate submitted for the case that actually occurred is relevant for this. The estimate given for the case that actually occurred determines the round payoff of the observed Member A.

Only at the end of the entire experiment does an observer learn their round payoff, and before that does not learn which case for which they submitted an estimate was actually relevant in a round.

Figure 6: Example image of the observer's estimate of the type of Member A from another group. Only at the end of the experiment does the observer learn which of the four cases actually occurred and is therefore payoff-relevant for them..

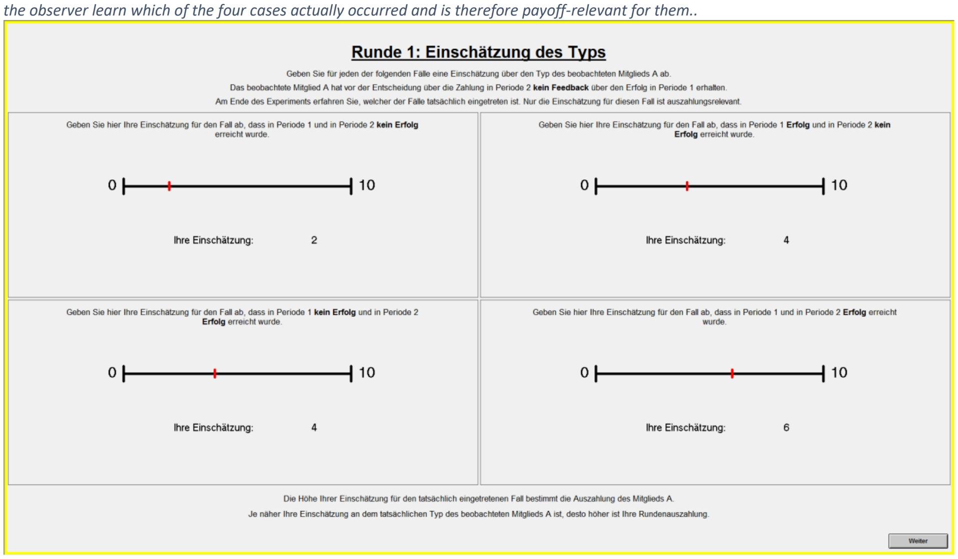
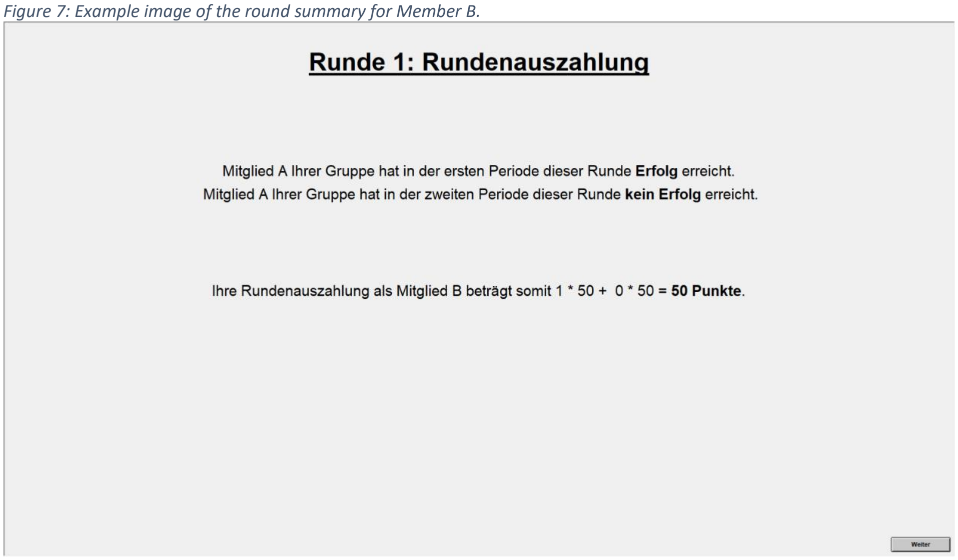


Figure 7: Example image of the round summary for Member B.



Feedback of a round

Member B learns at the end of each round how often success was achieved by Member A (0, 1, or 2 times). Member B does not learn the type of Member A, and also not whether Member A paid the cost for the chance of success.

An observer does not learn at the end of the round which of the four cases actually occurred. Only at the end of the experiment does the observer learn, for the two randomly selected rounds, the true type of the observed Member A. The observer does not learn whether this Member A paid the cost for the chance of success.

Member A and Member B learn, after the 10 questions at the beginning of the experiment, how many questions were answered correctly. In each round, Member A learns whether success was achieved in the second period. In addition, Member A learns the round payoff, that is, the observer's estimate of the type of Member A. Member B of the same group decides whether Member A learns in a round whether success was achieved in the first period. If Member B of a group chooses a round "with feedback", Member A learns after the first period and before the second period of a round whether success was achieved in the first period. If Member B chooses a round "without feedback", Member A never learns whether Period 1 of that round resulted in success.

Total Payment

The payment at the end of the experiment for Member A consists of:

- Round payoffs from 3 randomly selected rounds.
- 6 euros for arriving on time.

The payment at the end of the experiment for Member B / Observer consists of:

- Round payoffs for Member B from 2 randomly selected rounds.
- Round payoffs for the observer from 2 randomly selected rounds.
- 6 euros for arriving on time.

Questions?

Please take your time to go through the instructions once again. If you have a question, please raise your hand. An experimenter will then come to your seat and answer the question personally. If you believe that you have understood everything, please click "Start" on the screen. Next, control questions will appear on the screen. The control questions are intended to ensure that every participant has understood the instructions. The answers do not affect the payment. After answering the control questions, you can click "continue" to see the solutions and compare your answers with the correct ones. Once all participants have answered the control questions and all uncertainties have been clarified, the experiment will begin.

A2 Abstract Treatment

Overview

Welcome to this experiment. We ask you not to speak with other participants during the experiment and to switch off your mobile phones and other mobile electronic devices.

For participating in today's session, the amount you earn will be paid out to you in cash at the end of the experiment. The size of the payment depends partly on your decisions, partly on the decisions of other participants, and partly on chance. It is therefore important that you carefully read and understand the instructions before the experiment begins.

In this experiment, every interaction between participants takes place via the computers in front of which you are seated. You will interact with each other anonymously and your decisions will only be stored together with your random ID number. Neither your name nor the names of other participants will be revealed, neither today nor in future written analyses.

Today's session consists of several rounds. At the end, a total of 2 or 3 rounds will be randomly selected and paid out. The rounds that are not selected will not be paid. Your payment amount results from the points earned in the selected rounds, converted into euros, as well as your show-up fee of 4 euros. The conversion of points into euros is as follows: Each point is worth 4 cents, so that:

$$25 \text{ Points } = 1 \text{ Euro}$$

Each participant will be paid privately so that other participants cannot see how much you have earned.

Experiment

The experiment consists of two parts with a total of 10 rounds. The rounds within Parts 1 (Rounds 1 – 5) and 2 (6 – 10) are identical in structure. The instructions for the second part will be provided after the completion of the first part.

At the beginning of the experiment, you will be randomly assigned either the role of **Member A** or **Member B / Observer**. Each participant keeps this role for the entire experiment.

The Group

In the first round, you will be assigned to a large group of 8, 10, or 12 members. At the beginning of each round, two participants from your respective large group will be randomly selected to form a group in that round. Each group consists of one Member A and one Member B. The members of a group are therefore randomly reassigned in every round.

General Structure of a Round

Each round consists of two periods. In each period, Member A can decide whether to pay a cost of 30 points in order to have a chance of success in that period. The probability of success, if the cost of 30 points is paid, is determined by the type of Member A (between 0 and 100%). Success in a period determines the payoff of Member B in the respective group. At the end of a round, an observer estimates the type of Member A based on the successes of this Member A in that round. This estimate determines the round payoff of Member A.

Member A

Member A starts each round with a budget of 60 points. At the beginning of each round, each Member A is randomly assigned a type. This type is a number between 0 and 100, with each number being equally likely. This type remains fixed for the entire round. Member B of the same group does not learn the randomly assigned type of Member A. In each round, Member A must make two decisions (see Figures 1 and 2):

1. Whether to pay a cost of 30 points in the first period in order to have a chance of success in the first period.
2. Whether to pay a cost of 30 points in the second period in order to have a chance of success in the second period.

If Member A decides not to pay the cost of 30 points in a period, success in that period cannot occur. If Member A decides to pay the cost of 30 points in a period, the chances of success in that period are determined by the type: a Member A of type 60, for example, has a probability of success of 60% in every period in which they pay the 30 points. No other participant learns whether Member A decided to pay the cost.

Success in a period increases the round payoff of Member B in the same group. An observer (a Member B from another group) provides an estimate of the type of Member A, depending on the success outcomes in a round. This estimate determines the round payoff of Member A: the higher the estimate of the type given by Member B, the higher the round payoff of Member A.

Figure 1: Example image of Member A's decision whether to pay 30 points in the first period in order to have a chance of success in the first period. In this example, the randomly assigned type is 41, and it was randomly determined that Member A does not receive feedback about the success of Period 1.

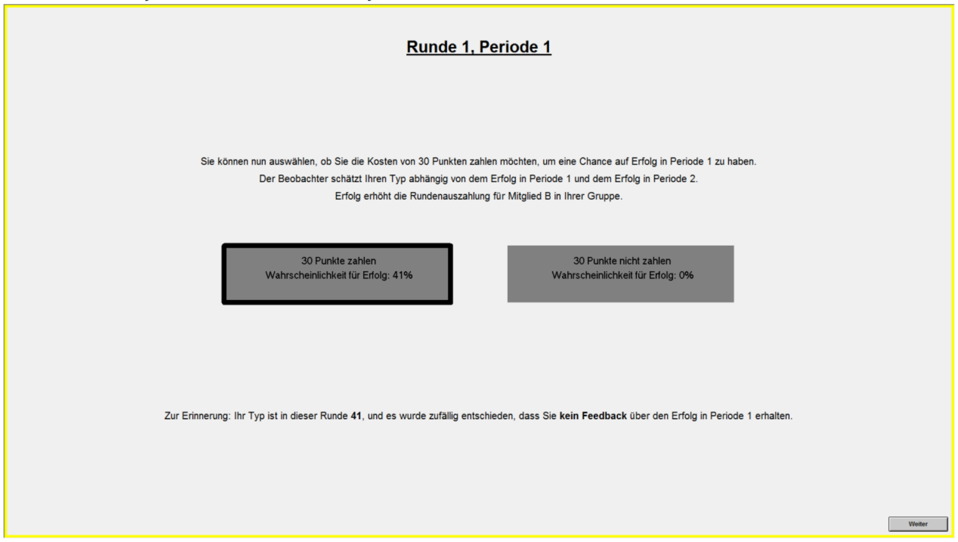
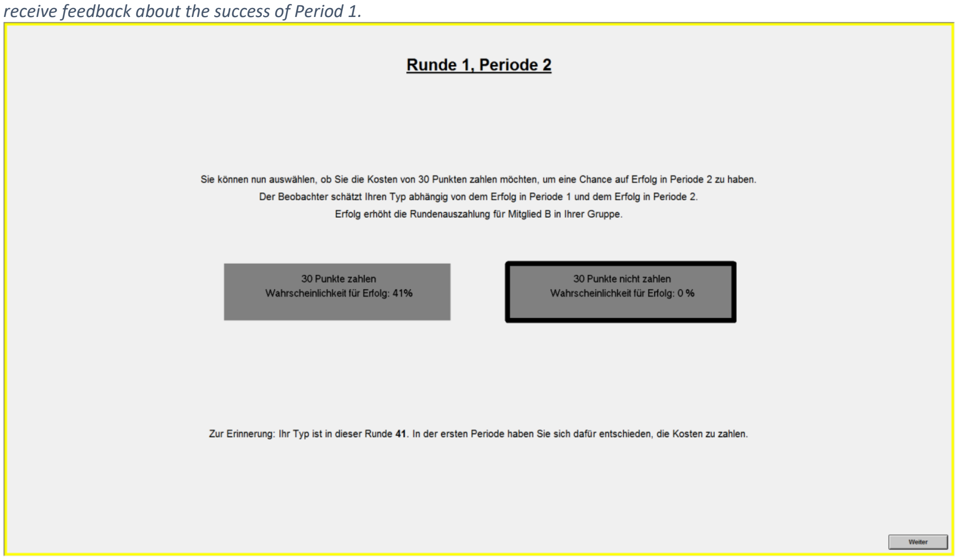


Figure 2: Example image of Member A's decision whether to pay 30 points in the second period in order to have a chance of success. In this example, the randomly assigned type is still 41, and it was randomly determined that Member A does not receive feedback about the success of Period 1.

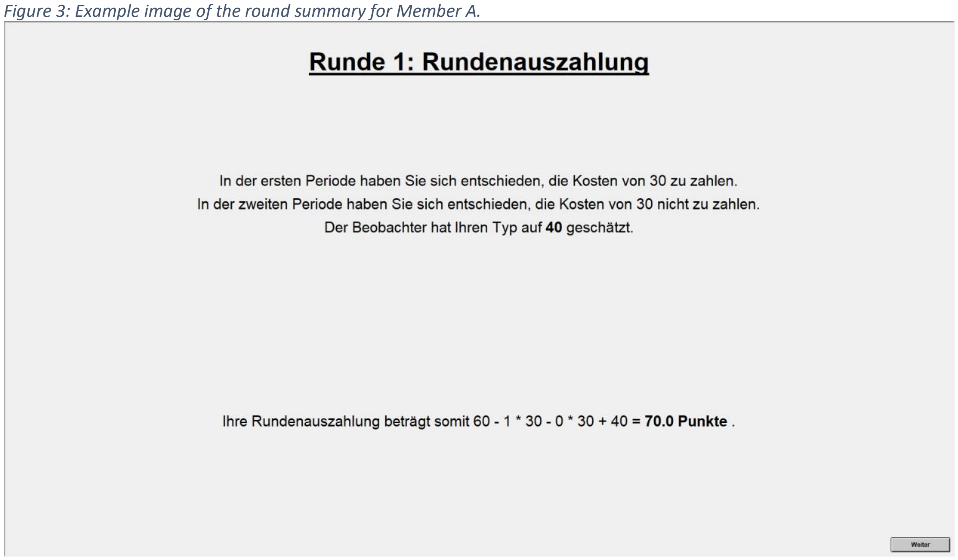


The payoff of Member A in a round is therefore:

- $60\ (starting\ endowment) +\ estimate\ of\ the\ observer$, if Member A decided not to pay the 30 points for chances of success in either period.
- $60\ (starting\ endowment) - 30\ (payment\ for\ chance\ of\ success\ in\ one\ period) +\ estimate\ of\ the\ observer$, if Member A decided to pay the 30 points for chances of success in one of the two periods.
- $60\ (starting\ endowment) - 60\ (payment\ for\ chance\ of\ success\ in\ both\ periods) +\ estimate\ of\ the\ observer$, if Member A decided to pay the 30 points for chances of success in both periods.

Example: A Member A of type 20 decides not to pay the 30 points for a chance of success in the first period. In the second period, Member A decides to pay the 30 points for a chance of success. The observer estimates the type of Member A to be 65 if no success occurred in the first period and success occurred in the second period. In addition, the observer estimates the type of Member A to be 35 if no success occurred in either of the two periods. With 20% probability (the type of Member A), Member A has success in the second period and the payoff is therefore: 60 - 30 + 65 = 95 points. With 80% probability, Member A has no success in the second period and the payoff of Member A is 60 - 30 + 35 = 65 points.

Figure 3: Example image of the round summary for Member A.



Member B / Observer of another group

At the end of each round, Member B of the group receives 50 points for each success of Member A of the same group. If Member A therefore has success in both periods of a round, the round payoff of Member B is 100 points. If Member A has success in only one period, the round payoff of Member B is 50 points. If Member A has no success in both periods, the round payoff of Member B is 0 points. Member B never learns whether Member A of the same group paid 30 points in a period in order to have a chance of success or not.

As an **observer**, a Member B observes the Member A of another group. Here, the observer provides an estimate of the type of Member A for each possible success outcome (see Figure 4).

The payoff for the observer is as follows:

$$Round\ payoff\ =\ 100\ - |submitted\ estimate - actual\ type\ of\ Member\ A|$$

The closer the observer's estimate is to the true type of Member A, the higher the observer's round payoff. The estimate submitted for the case that actually occurred is relevant for this. The estimate given for the case that actually occurred determines the round payoff of the observed Member A.

Only at the end of the entire experiment does an observer learn their round payoff, and before that does not learn which case for which they submitted an estimate was actually relevant in a round.

Figure 4: Example image of the observer's estimate of the type of Member A from another group. Only at the end of the experiment does the observer learn which of the four cases actually occurred and is therefore payoff-relevant for them.

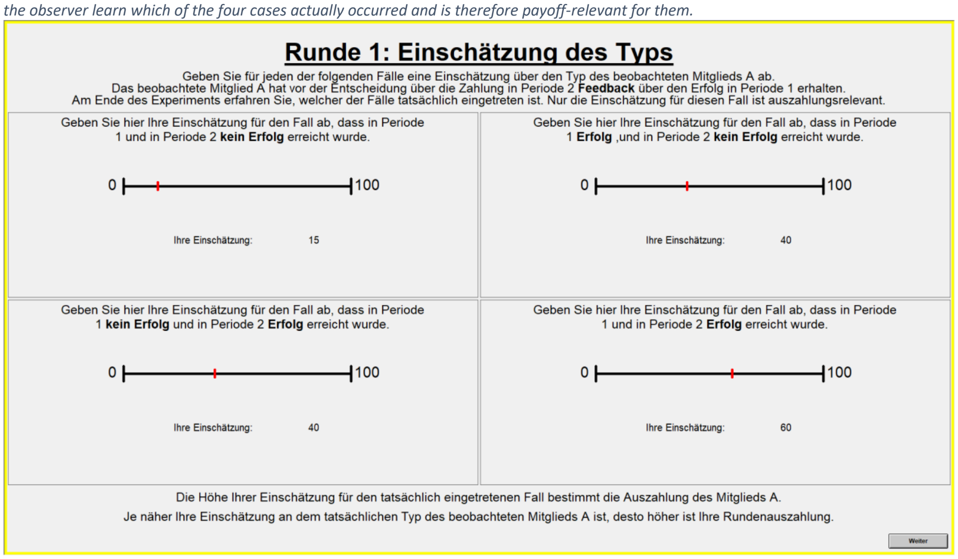
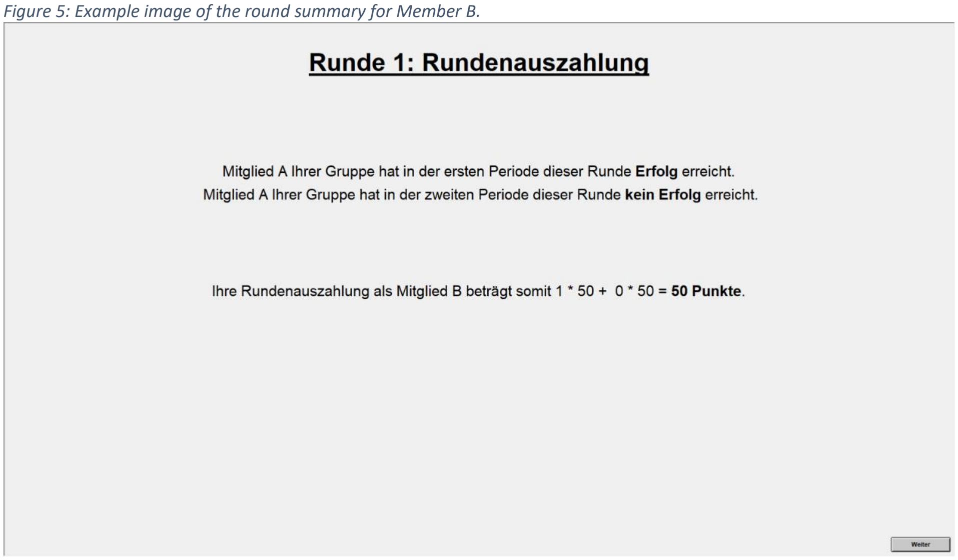


Figure 5: Example image of the round summary for Member B.



Feedback of a round

Member B learns at the end of each round how often success was achieved by Member A (0, 1, or 2 times). Member B does not learn the type of Member A, and also not whether Member A paid the cost for the chance of success.

An observer does not learn at the end of the round which of the four cases actually occurred. Only at the end of the experiment does the observer learn, for the two randomly selected rounds, the true type of the observed Member A. The observer does not learn whether this Member A paid the cost for the chance of success.

In each round, Member A learns their own type and whether they achieved success in the second period. In addition, Member A learns the round payoff, that is, the observer's estimate of the type of Member A. At the beginning of a round, it is randomly determined whether Member A learns in that round whether success was achieved in the first period. In a round "with feedback", Member A learns after the first period and before the second period of a round whether success was achieved in the first period. In a round "without feedback", Member A never learns whether Period 1 of that round resulted in success.

Total Payment

The payment at the end of the experiment for Member A consists of:

- Round payoffs from 3 randomly selected rounds.
- 4 euros for arriving on time.

The payment at the end of the experiment for Member B / Observer consists of:

- Round payoffs for Member B from 2 randomly selected rounds.
- Round payoffs for the observer from 2 randomly selected rounds.
- 4 euros for arriving on time.

Questions?

Please take your time to go through the instructions once again. If you have a question, please raise your hand. An experimenter will then come to your seat and answer the question personally. If you believe that you have understood everything, please click “Start” on the screen. Next, control questions will appear on the screen. The control questions are intended to ensure that every participant has understood the instructions. The answers do not affect the payment. After answering the control questions, you can click “continue” to see the solutions and compare your answers with the correct ones. If all participants have answered the control questions and all uncertainties have been clarified, the experiment will begin.