Seeing is Believing? An Experiment on Strategic Thinking.*

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Abstract

The order and observability of actions in a game determine the informational inferences players can make. Intuition suggests that such inferences require a higher level of sophistication when they concern actions that are not directly observed, like in simultaneous action games, compared to sequential games where a player can observe others' actions before making decisions. This intuition contrasts with the assumption of full sophistication embodied in the Bayes-Nash equilibrium concepts. Informational cascades the winner's curse may depend on, respectively, the ability or inability to make such inferences. We use a novel experimental design in which subjects play, both simultaneously and sequentially, a game in which either of these phenomena can occur. We find that, in accordance to our intuition, some subjects participate in informational cascades in the sequential game and suffer a winner's curse in the simultaneous game. "Level-k" thinking and "cursed equilibrium" are theories that have been proposed to explain why an individual may suffer from the winner's curse in common value auctions and other environments. Nevertheless, according to these theories the same individual could not participate in an informational cascade. Therefore, our results contradict the predictions of both classical and behavioral theories.

Keywords: *winner's curse, informational cascades, level-k, cursed equilibrium, strategy method.*

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1 Introduction

According to a known anecdote, the comedian Groucho Marx (GM) once sent a message to the Friar's Club of Beverly Hills to which he belonged, saying: "Please accept my resignation. I don't want to belong to any club that will accept people as me as their member". [1] Is the behavior of the comedian in accordance with the prescriptions of classical game theory, embodied in the notions of the Bayesian Nash and Perfect Bayesian equilibria? Well, GM observed the club's action - accepting him as a member, inferred that such action conveyed the information that the club is not of his liking and therefore resigned. Learning from the actions of other agents is exactly what classical game theory prescribes. Still, were GM "perfectly bayesian" he would never have applied for the club in the first place! By applying he either gets rejected and stays out of the club, or accepted and becomes member of a club that reveals itself to be unacceptable to him, leading him to resign. Not applying keeps him out of the club saving him all the trouble from the start.

While one can only speculate why the comedian chose to apply to the club in the first place, let us assume he lacked the strategic sophistication needed for performing the above reasoning. In contrast to classic game theory, recent theories, such as "cursed equilibrium" or level-k reasoning try to explain why some agents may be less sophisticated than others. Nevertheless, no theory explains how GM can be sophisticated enough to resign from the club after being accepted, but not so in order to never apply in the first place. Can we observe such a behavior outside the realm of anecdotes? We offer experimental evidence that suggest we can. We develop and implement a novel experimental design that allows us to classify subjects according to their level of strategic sophistication and to identify individuals that behave like GM. A significant portion of our subjects fits this class. Based on some additional experimental evidence and the subjects' own interpretations of their behavior we conjecture upon the drivers of such behavior.

It must be made clear right from the start that what we are concerned with are players' initial responses to games. We do not consider the case where a game is played more times, allowing players to learn and develop better strategies.

To fix the ideas, let us analyze our example a bit further. We must note that reaching GM's conclusion as stated in the letter is not trivial in itself. One has to

[1]This incident inspired M. Harris to name a theorem of Migrom and Stockey (1982) the "Groucho Marx theorem". That result is only tangentially related to this paper.

realize that others' actions are driven by their private information (in this case, the quality of the club) and infer this information by observing their actions. Let us call this *Information Inference from Observed Actions (IIOA)*. The reasoning prescribed by classical game theory and that should prevent GM from applying, adds an additional layer of sophistication. A player should form expectations about the outcomes of the game, given his actions, that are conditional on the possible actions of others *and* the information that drives them. Let us call this *Information Inference from Future Actions (IIFA)*.[2] IIOA is embedded in IIFA in the sense that an individual should be able to perform the latter only if she is able to perform the former. On the other hand, there is no obvious reason why ability to perform IIOA should imply an ability to perform IIFA. This subtle, although substantial point has escaped the attention of most analysis of strategic thinking.

A lack of strategic sophistication on part of some agents has recently been advanced as a possible explanation for the failure of the Bayesian Nash equilibrium notions to predict phenomena such as the winner's curse (WC) or the existence of trade in markets with adverse-selection problems. Eyster and Rabin (2005) [14] propose the notion of "Cursed equilibrium". A "cursed" player correctly predicts the distribution of other players' actions, but fails to recognize their informational content. In our terms, they allow for players that are not able to perform IIOA, something that automatically excludes IIFA as well. The lack of sophistication of "cursed" players is directly connected to the existence of private information. In complete information environments such a player would not behave any differently than a "Nash type" player.

The theory of level-k reasoning on the other hand was advanced to explain behavior in complete information environments (Stahl and Wilson, 1995 [20]; Nagel, 1995 [18]) and has recently been applied to games with private information(Crawford and Irriberi, 2007 [10]). It posits that players reason at different levels. Level-0 players pick an action randomly with a probability uniformly distributed over their action space. A level-k player believes all others to be of level $k-1$ and plays a best response to their strategy. In a game with private information, given the definition of level-0 players, a level-1 player's best response must depend on his private information alone. He fails to realize that other players may not be level-0 players and their actions may have and infor-

[2] Here use the term "future actions" for actions that have not been observed. This does not mean that these actions necessarily take place after one's decision. It means that the individual may only find out what these actions are after taking her own decision.

mational content.[3] Level-2 players consider everybody else to be a level-1 player and best reply to that. They recognize that others' actions reveal their private information. Although a level-2's behavior may still not coincide with a "Bayesian Nash" player's behavior, he is performing IIOA and IIFA (if necessary) in order to calculate his best response. Here, in contrast to "cursed equilibrium" theory, players are not considered unable to perform either IIOA or IIFA. Still, given the way players form their beliefs about others, level-1 players do not use neither of the two to calculate their best response.

While these theories allow for a lack of strategic sophistication that causes a failure to perform IIOA or IIFA, this is introduced in a way that does not capture the difference between the two. Actually, for most applications of such theories to date this failure is irrelevant. These theories have been applied to games with private information in order to explain empirical observations (field or lab data) that conventional game theory failed to predict. In each of these cases standard game theory expects players to either perform IIOA or the more complex IIFA. As long as a significant portion of players fails to perform either of the two, the alternative theories that allow for different levels of sophistication will generally perform better in terms of prediction. Whether these players fail only in IIFA or both is not an issue, since only one of the two is required in these applications. But if one needs a theory not only to fit existing data but to also make predictions of how different designs of markets or institutions affect the behavior of participants, this distinction becomes important. Consider an agent with the sophistication of GM: able to perform IIOA but not IIFA. Participating in a sealed bid common value auction he is likely to be a victim of the WC. If on the other hand the design changes to that of an ascending price auction, the WC is less likely to be a problem for this agent. Similarly, his behavior as a juror should be different if the jury votes simultaneously or sequentially, observing what others vote.

We use an experimental design based on the model in Louis (2011) [17]. It allows us to observe subjects' behavior in a game played both simultaneously and sequentially. We can therefore classify them based on that behavior in to different types. One of these matches the behavior of a GM type individual and it is distinct from the behavior predicted by any other theory.

[3] In the strict version of this theory, level-0 players exist only in the minds of level-1 players and one should not expect to observe any level-0 behavior.

1.1 Literature Review

The literature related to this paper can be divided in two broad and related themes. On the one hand there is research that looks at different games and tries to verify through experiments or empirical observations whether individuals' behavior is the one predicted by the appropriate game theoretic solution concepts. On the other hand, and more recently, scholars have developed and adapted new theories of strategic thinking that give predictions closer to the behavior observed in the lab and field. Our work moves to a new direction. Although this paper does not provide a new theory for strategic behavior, it points out some blank spots in existing theories. Furthermore, using an appropriate experimental design it demonstrates how because of these blank spots, existing theories fail to accurately describe individuals' strategic thinking in ways that can be relevant in economic applications.

It was a group of engineers that noticed for the first time a systematic and significant deviations of economic agents from the prescriptions of the classic game theoretic notions of Bayesian-Nash equilibrium. Capen, Clapp and Campbell (1971) [8] noticed how petroleum companies' returns from leases acquired through competitive bidding were lower than expected. Their explanation involved the failure of companies to take in to account the fact than winning the auction is an indication of overbidding, and adjust their bids accordingly. They termed this phenomenon a winner's curse. Thaler (1988) [21] provides a survey of the early empirical and experimental evidence supporting the existence of such curse. In our context, the winner's curse could be attributed to a failure to perform IIFA.

Moving from an environment of simultaneous actions to one of sequential actions, we find the literature on informational cascades. Banerjee (1992) [5] and Bikhchandani et at. (1992) [6] showed that in environments with a common value and social learning, agents can infer the information of others' by observing their behavior. This can give rise to rational herding behavior were a significant proportion of individuals end up taking the same action and ignoring their private information. Anderson and Holt (1997) [3] were the first to use a lab experiment to test for the existence of informational cascades. For more recent experimental studies in to the matter the reader can can look at Goeree et al. (2007) [15] and the references therein. Although the length and robustness of cascades is affected by the specific test environment, cascades do appear in the lab. Bikhchandani and Sharma (2001) [7] provide a survey of the related empirical literature while Drehmann et. al. (2005) [13] and Alevy et al. (2007) [1] use field experiments to detect the existence of cascades outside the lab. Putting informational cascades in to our context, it requires agents being able to perform IIOA.

The literature on voting touches on both IIOA and IIFA. Austen-Smith and Banks (1996) [4] were the first to notice that the ability of agents to perform IIFA may prevent a committee voting simultaneously to aggregate information efficiently. On the other hand, Dekel and Piccione (2000) [12] compare this situation with one in which agents vote sequentially, and assuming they fully rational (able to perform both IIOA and IIFA). Ottaviani and Sørensen (2001) [19] look at the possibility of informational cascades when voting is sequential. The idea of strategic voting as proposed by Austen-Smith and Banks has found support in experimental evidence in Guarnaschelli et al. (2000) [16] and Nageeb et al (2008) [2].

As was mentioned above, alternative theories that abandon perfect rationality in the strategic thinking of agents have been put forward, especially as a response to the failure of classic game theory to explain the persistence of the winner's curse in various applications. Eyster and Rabin (2005) [14] proposed the concept of "cursed equilibrium". Cursed agents fail to take in to account the informational content of others' actions. Translated to our context, a "cursed" individual is not able to perform IIOA and therefore, neither IIFA. Crawford and Iriberri (2007) [10] apply the "level-k" thinking model to environments with incomplete information. In such a model, level-1 individuals lack the sophistication to perform both IIOA and IIFA. Individuals of level-2 and higher can perform both. Neither "cursed equilibrium" nor "level-k" thinking allow for individuals of the GM type: able to perform IIOA but not IIFA.

Charness and Levin (2009) [9] also take a critical approach to these alternative theories, especially as far as the winner's curse is concerned. They use an experimental design that allows for the winner's curse to be detected, but precludes "cursed" behavior or "level-k" thinking as explanations. They find that simple bounded rationality, as opposed to unsophisticated strategic thinking, can go a long way in explaining the curse. Although our paper shares the critical nature of their approach, it uses a different strategy. We look at a situation where existing theories make predictions about individual behavior. We show that they fail to a significant extent.

Crawford, Costa-Gomes and Iriberri (2010) [11] offer a very complete survey of the literature in strategic thinking.

2 Experimental Design

The aim of our experiment is to verify the existence of individuals that seem able to perform IIOA but fail to perform IIFA. For brevity we shall call such an individual a GM type. To achieve that, we have subjects playing a game both simultaneously and sequentially. The game is such that a GM type individual is expected to play differently in each case and in a way not predicted by any of the relevant theories.

The game is based on an n-player matching market game with limited supply, found in Louis (2011) . Here we use the 2-player version. Players are offered a single object which they can accept or reject. Only one player can keep the object even if both accept it. Player 1 has priority. In the sequential version of the game, player 1 decides whether to accept or reject. If he accepts, he keeps the object and the game ends. If he rejects, player 2 is allowed to choose. If he accepts he keeps the object, and if he rejects then no player keeps the object. In the simultaneous version, both players must choose simultaneously. The object is assigned to any player that has accepted, respecting priority: if both accept player 1 keeps the object.

Payoffs depend on the state of nature which can be "good" or "bad" with a priori equal probability. If the state is "good", a player with the object gets a payoff of 1 and a player without the object gets zero payoff. If the state is "bad", a player with the object gets zero while a player without the object gets 1. Players have private information about the state of nature. This takes the form of a binary signal $s_i \in \{g, b\}$. If the state is "good", the probability of the signal being $s_i = g$ is $Pr(s_i = g|``good'') = 1$. If the state of nature is "bad", $Pr(s_i = b|``bad'') = q$. Given this information structure, if the signal is b, it perfectly reveals the state of nature to be "bad". The signal g means the state of nature is more likely to be "good".

In this game there is a possibility for player 2 to suffer from a type of winner's curse. The idea is the following: player 1 is not affected in any way by the actions of player 2. This means he faces a simple decision problem and therefore the most natural thing for him to do is to follow his private signal. This means to accept the object when observing $s_1 = g$ and rejecting it when $s_1 = b$. Notice that in this last case player 1 actualy knows that the state of nature is "bad". If player 1 plays like this, then player 2 can only keep the object when the state is "bad", and thus accepting it can only make him a victim of the winner's curse. Notice that whether the action of player 1 is observable or not (sequential or simultaneous play) is irrelevant for the existence of the WC. It is relevant as to what type of reasoning is required for player 2 to recognize the WC in order to avoid it. In the sequential game IIOA is enough. In the simultaneous game, the more sophisticated IIFA is required.

Before entering the details of how the design was implemented in the actual experiment, we briefly explain the different theoretical predictions about the players' behavior. It must be made clear from the start that our focus lies on player 2. It is this player that could use IIOA or IIFA and hence his ability to perform either affects his behavior. Player 1 is simply instrumental. Although part of the game, he faces a simple decision problem with no need or possibility to perform either reasoning process (IIOA or IIFA) and his behavior is not predicted to vary by any theory.

2.1 Theoretical predicitons

First let us fix notation. The subscript $i \in \{1, 2\}$ denotes the player. Players makes a choice $x_i \in X = \{A, R\}$. The state of nature is $\theta \in \Theta = \{G, B\}$. Let $f_i : X^2 \to X$ be the assignment function. In particular,

$$f_1(x_1, x_2) = x_1$$

and

$$f_2(x_2, x_1) = \begin{cases} x_2, & for\ x_1 = R \\ R, & for\ x_1 = A \end{cases}$$

. For notational economy we use the set of choices to also denote the set of outcomes. The outcome A means the player keeps the object, while the outcome R means he does not keep it. Payoffs are given by

$$u_i\left(f(x_i, x_{-i}), \theta\right) = \begin{cases} 1, & f(x_i, x_{-i}) = A\ \&\ \theta = G \\ 1, & f(x_i, x_{-i}) = R\ \&\ \theta = B \\ 0, & otherwise \end{cases}$$

We say that a player *plays informatively* if his choice corresponds to his signal. That is if $x_i = A$ when $s_i = g$ and $x_i = R$ when $s_i = b$. On the other hand we say a player *herds* if he chooses to reject the object independently of his private signal. The case of always accepting does not come up in any situation so we have no name for it. Also, for the economy of the analysis we must note that if a player has private signal $s_i = b$, he knows for sure that the state of nature is "bad". Since we assume players to be individually rational, it is always optimal for them to reject after observing this private signal, independently of the other's choices. Thus the analysis below focuses on what players when observing private signal $s_i = g$.

2.1.1 Bayesian Nash equilibrium

Player 1
Player 1 faces a simple decision problem. The choice of player 2 does not affect his outcomes. If his private signal is $s_1 = b$ he knows the state of nature is $\theta = B$ and thus the optimal choice is to reject. If $s_1 = g$ then his expected payoff from accepting is:

$$\begin{aligned} E[u_1(x_1 = A, \theta)|s_1 = g] &= Pr(\theta = G|s_1 = g) \\ &= \frac{1}{1 + 1 - q} \\ &= \frac{1}{2 - q} \end{aligned}$$

His expected payoff from rejecting is:

$$\begin{aligned} E[u_1(x_1 = R, \theta)|s_1 = g] &= Pr(\theta = B|s_1 = a) \\ &= \frac{1 - q}{1 + 1 - q} \\ &= \frac{1 - q}{2 - q} \end{aligned}$$

It is easy to see that $E[u_1(x_1 = A, \theta)|s_1 = g] > E[u_1(x_1 = R, \theta)|s_1 = g]$ and therefore it is optimal to accept. Hence, player 1 plays informatively. Notice that this is true independently of whether the game is played simultaneously or sequentially. This is because player 1 knows he has priority over player 2.

Player 2 - Simultaneous play.
Now consider player 2. He calculates expected payoffs taking in to account player 1's strategy. Since player 1 plays informatively, player 2's expected

payoff from accepting when $s_2 = a$ is:

$$\begin{aligned} E[u_2(f_2(A, x_1), \theta)|s_2 = g] = & Pr(\theta{=}G|s_2{=}g)\,[Pr(s_1{=}g|\theta{=}G)\cdot 0 + Pr(s_1{=}b|\theta{=}G)\cdot 1] \\ & + Pr(\theta{=}B|s_2{=}g)\,[Pr(s_1{=}g|\theta{=}B)\cdot 1 + Pr(s_1{=}b|\theta{=}B)\cdot 0] \\ =& Pr(\theta{=}B|s_2{=}g)Pr(s_1{=}g|\theta{=}B) \\ =& \frac{(1-q)^2}{2-q} \end{aligned}$$

His expected payoff from choosing B when $s_2 = g$ is:

$$\begin{aligned} E[u_2(f_2(R, x_1), \theta)|s_2 = g] =& Pr(\theta = B|s_2 = g) \\ =& \frac{1-q}{2-q} \end{aligned}$$

We see that $E[u_2(f_2(A, x_1), \theta)|s_2 = g] < E[u_2(f_2(R, x_1), \theta)|s_2 = g]$ and thus player 2 rejects. Since he does the same when his signal is $s_2 = b$, we say player 2 herds. Notice that these calculations assume that player 2 is able to perform IIFA.

Player 2 - Sequential play.
Now player 2 observes player 1's choice before making his own. If player 1 accepts, then there is no choice to be made by player 2, since player 1 keeps the object, given his priority. If player 1 rejects, then player 2 must choose. But player 2 knows that player 1 rejects only after observing $s_1 = b$ which means that the state of nature must be "bad". Thus he also rejects independently of his signal. Notice here that this reasoning requires IIOA (but not IIFA).

2.1.2 Cursed equilibrium

A cursed equilibrium is the predicted outcome of a game played by cursed players. A fully cursed player can correctly predict the distribution of the others' actions but does not recognize the informational content of these[4]. According to the cursed equilibrium theory players' "cursedness'' is measured by a parameter χ. With probability χ a players beliefs are the ones of a fully cursed player and with probability $1 - \chi$ they coincide with the ones of a rational player.

[4]Such behavior gives rise to the winner's curse in auctions and other common-value environments, hence the term "cursed"

Player 1.
Here again player 1 faces a decision problem and his payoff is not affected by player 2's actions. Therefore it does not matter whether he is cursed or not. His optimal play is the same as in the case of bayesian-nash players for any degree of "cursedness" χ. Player 1 plays informatively.

Player 2 - Simultaneous play.
A fully cursed player 2 correctly predicts the distribution of player 1's actions. This means he believes that player 1 accepts with probability:

$$\begin{aligned}
Pr(x_1 = A|s_2 = g) = Pr(s_1 = g|s_2 = g) &= \sum_{\theta\in\Theta} Pr(s_1 = g, \theta|s_2 = g) \\
&= \sum_{\theta\in\Theta} [Pr(s_1 = g|\theta) \cdot Pr(\theta|s_2 = g)] \\
&= \frac{1}{2-q} + (1-q)\frac{1-q}{2-q} \\
&= 1 - \frac{q(1-q)}{2-q}
\end{aligned}$$

and rejects with the complementary probability:

$$Pr(x_1 = R|s_2 = g) = \frac{q(1-q)}{2-q}$$

Therefore, his expected payoff with these cursed beliefs from accepting after observing $s_2 = g$ is:

$$\begin{aligned}
E_c[u_2(f_2(A, x_1), \theta)|s_2 = g] = &\; Pr(\theta{=}G|s_2{=}g)\, [Pr(x_1{=}A) \cdot 0 + Pr(x_1{=}R) \cdot \gamma] \\
&+ Pr(\theta{=}B|s_2{=}g)\, [Pr(x_1{=}A) \cdot 1 + Pr(x_1{=}R) \cdot 0] \\
=&\, Pr(\theta{=}G|s_2{=}g) \cdot Pr(x_1{=}R) \cdot \gamma + Pr(\theta{=}B|s_2{=}g) \cdot Pr(x_1{=}A) \\
=&\; \frac{1}{2-q}\frac{q(1-q)}{2-q} + \frac{1-q}{2-q}(1 - \frac{q(1-q)}{2-q}) \\
=&\; \frac{1-q}{2-q} + \frac{q^2(1-q)}{(2-q)^2}
\end{aligned}$$

His (cursed) expected payoff from rejecting after observing $s_2 = g$ is:

$$E_c[u_2(f_2(R, x_1), \theta)|s_2 = g] = Pr(\theta = B|s_2 = g)$$
$$= \frac{1-q}{2-q}$$

Since $E_c[u_2(f_2(A, x_1), \theta)|s_2 = g] > E_c[u_2(f_2(R, x_1), \theta)|s_2 = g]$, player 2 accepts. This means a fully cursed player 2 plays informatively.

Now consider the case where player 2 is not fully cursed, rather his degree of "cursedness" depends on the parameter χ. His expected payoff based on these partially cursed beliefs is a convex combination between the expected payoff calculated by a rational player and the one of a fully cursed player:

$$E_\chi[u_2(f_2(A, x_1), \theta)|s_2 = g] = \chi \cdot [\frac{1-q}{2-q} + \frac{q^2(1-q)}{(2-q)^2}]$$
$$+ (1-\chi) \cdot [\frac{(1-q)^2}{2-q}]$$

and

$$E_\chi[u_2(f_2(R, x_1), \theta)|s_2 = a] = Pr(\theta = R|s_2 = g)$$
$$= \frac{1-q}{2-q}$$

In order to play informatively the following condition must hold:

$$E_\chi[u_2(f_2(A, x_1), \theta)|s_2 = g] > E_\chi[u_2(f_2(R, x_1), \theta)|s_2 = g]$$
$$\Leftrightarrow$$

$$\chi \cdot [\frac{1-q}{2-q} + \frac{q^2(1-q)}{(2-q)^2}] + (1-\chi) \cdot [\frac{(1-q)^2}{2-q}] > \frac{1-q}{2-q}$$
$$\frac{2-q}{2} < \chi$$

Thus there is a threshold level for χ. For values above the threshold player 2 plays informatively. For values of χ below the threshold he herds.

Player 2 - Sequential play.
Now player 2 observes the choice of player 1 so there is no question about whether he correctly predicts the distribution of player 1's actions. Still, a fully cursed player 2 does not realize that when player 1 rejects he does so because he observed $s_1 = b$. When player 1 accepts the game stops, therefore we focus on the case where player 1 rejects. Player 2's expected payoff from accepting when observing $s_2 = g$ is:

$$\begin{aligned} E_c[u_2(f_2(A,R),\theta)|s_2 = g] =& Pr(\theta = G|s_1 = g) \\ =& \frac{1}{2-q} \end{aligned}$$

The expected payoff from rejecting is:

$$\begin{aligned} E_c[u_2(f_2(R,R),\theta)|s_2 = g] =& Pr(\theta = B|s_2 = g) \\ =& \frac{1-q}{2-q} \end{aligned}$$

Again we see that a fully cursed player 2 has a higher expected payoff by accepting, so he does so.

Now we consider a partially cursed player 2. Given a value for χ his expected payoff from accepting is:

$$E_\chi[u_2(f_2(A,R),\theta)|s_2 = g] = \chi \cdot \frac{1}{2-q} + (1-\chi) \cdot \frac{(1-q)^2}{2-q}$$

and from rejecting:

$$\begin{aligned} E_\chi[u_2(f_2(R,R),\theta)|s_2 = g] =& Pr(\theta = B|s_2 = g) \\ =& \frac{1-q}{2-q} \end{aligned}$$

In order to play informatively the following condition must hold:

$$\begin{aligned} E_\chi[u_2(f_2(A,R),\theta)|s_2 = g] >& E_\chi[u_2(f_2(R,R),\theta)|s_2 = g] \\ \Leftrightarrow& \end{aligned}$$

$$\chi \cdot \frac{1}{2-q} + (1-\chi) \cdot \frac{(1-q)^2}{2-q} > \frac{1-q}{2-q}$$
$$\frac{1-q}{2-q} < \chi$$

Again there is a threshold as in the case of simultaneous play. For values above the threshold player 2 plays informatively. For values of χ below the threshold he herds.

It is important to notice that $\chi_{seq} = \frac{1-q}{2-q} < \frac{2-q}{2} = \chi_{sim}$. This means that for $\chi \in (\chi_{seq}, \chi_{sim}]$ a partially cursed player 2 herds in the simultaneous game but plays informatively in the sequential game.

2.1.3 Level-k reasoning

According to the theory of level-k reasoning, each player is of a type $k > 0$. A player of type k best responds to the strategy of players of type $k-1$. For the theory to have a content one must define how level 0 players play. In this context it is reasonable to assume that level-0 players randomize uniformly over the two alternatives. Then, the best response of a level-1 player is to follow his own signal. This coincides with the optimal play of player 1 for both the simultaneous and the sequential game and both for rational and fully cursed players. For player 2 this coincides with the behavior of a fully cursed player 2. A level-2 player 2 should then best respond in the same way as a fully rational player and herd. This is true both for the simultaneous and the sequential game.

Notice that level-1 players here do not perform IIOA in the sequential game and similarly they do not perform IIFA in the simultaneous game. While the observed behavior is the same as in the case of cursed equilibrium, the reason such players play naively is not because they are assumed unable to recognize the informational content of other's actions and use it to calculate their best response. They dot not perform either of these processes because they wrongly believe that other's play in a very naive way and there is no informational content in their actions.

2.1.4 Prediction summary

If players follow the Bayes-Nash prototype, they are expected to herd independently of whether the game is played simultaneously or sequentially. Cursed equilibrium and level-k reasoning allow for players to be of a less sophisticated type. These are fully cursed and level-1 players respectively. Such less sophisticated players are expected to play informatively in both types of games. These theories also allow for more sophisticated players whose behavior is the same as that of Bayes-Nash type players. Cursed equilibrium leaves a window for a type of player that plays differently depending on whether the game is simultaneous or sequential. This would be a player that is "partially cursed". The theoretical basis for such a type of player is not very clear and in any case the predicted behavior is quite counterintuitive. Such a player is expected to play informatively in the sequential game and herd in the simultaneous version. In any case, none of the theories predicts a behavior such as the one described for the GM type, that is to play informatively in the simultaneous game and herd in the sequential one. The following table summarizes these results.

Game	Bayes Nash	Cursed equilibrium			Level-k reasoning		GM type
		Fully cursed or low χ	Medium χ	High χ	level-1	level-2	
Simultaneous	**Herd**	*Informative*	**Herd**	**Herd**	*Informative*	**Herd**	*Informative*
Sequential	**Herd**	*Informative*	*Informative*	**Herd**	*Informative*	**Herd**	**Herd**

2.2 Implementation

The experiment took place in the Pompeu Fabra University in Barcelona. Subjects were first and second year students of the Faculty of Economics and Business that participated in the experiment during the last 15 minutes of a lecture, using pen and paper. A preliminary experiment took place two weeks earlier with a small number of 3rd and 4th year students that acted as player 1 in the game. Subjects in the main experiment were randomly matched to one of the preliminary experiment's subjects and acted as player 2.

Each subject received a document containing instructions and answer sheets for the experiment. Instructions were read out loud at the start and subjects had to complete a five question multiple choice comprehension test to show they understood the instructions. Not completing the test successfully, excluded them from any payment.

After that, each subject played two versions of the game. The different versions are described below. Subjects in the same group played the games in the same order. The information structure was reproduced by a method of urns.

In the "good" state the urn only contained 10 white balls. In the "bad" state the urn contained 1 white ball and 9 black balls. This means that the parameter q in the experiment took the value $0,9$.

The strategy method was used to elicit subjects' strategies. They were asked to indicate whether to accept or reject conditional on observing a white or black ball. This was done both for practical reasons as well of "experimental economy". First it shortened the duration of the experiment, since no actual draws had to be made during the 15 minutes of the class[5]. Most importantly though, the strategy method allows us to collect a much greater number of useful observations. To understand why, one has to think that our interest is to see whether subjects play informatively or herd. Has the strategy method not been used, any observation coming from a subject drawing a black ball (equivalent to $s_i = b$) would be practically useless.

After playing the game, subjects were asked to give an explanation for why they played the way they did in each game. They were also asked to report the grade with which they entered the university.

To determine payments one of the two games was chosen randomly and subjects were payed according to their outcome in that game. Subjects that kept the object in the "good" state or didn't do so in the "bad" state received a payment of 2 euros. These payments took place the next day in the premisses of the university.

2.2.1 Treatments

Each treatment consists in playing a different version of the game. While the game is always the same for player 1, we allow for 5 different versions to be played by player 2.

Treatment 1: Player 2 is asked to submit his strategy without observing the action of player 1. This is the straightorward simultaneous version of the game.

Treatment 2: Like in version 1, player 2 is asked to submit his strategy without observing the action of player 1. Still, his attention is called upon the fact that his actions only matter when player 1 rejects.

[5] in each group a subject volunteered to stay a few minutes after class and make a single draw which counted for all the subjects in the group

Treatment 2+: Player 2 is told he will have to make a choice after observing the action of player 1. Since there will be no need for a choice if player 1 accepts, player 2 is asked to submit a strategy for the case player 1 rejects.

Treatment 3: Player 2 observes the action of player 1. If player 1 accepts he does nothing. If player 1 rejects he submits his strategy.

Treatments 1 and 3 represent the two versions of the game, simultaneous and sequential. 2 and 2+ represent a different framing of these two versions.

3 Experimental Results

The experiment was conducted with 5 different groups. Two treatments were used in each group in different order. The following combinations were used: 13, 31, 12, 12+, 22+. The following table summarizes the composition of the different groups and their performance in the comprehension test.

Group	1	2	3	4	5
Treatment	13	31	12	12+	22+
# Subjects	74	72	69	20	20
Year	1st	2nd	2nd	2nd	2nd
Correct Tests	91% (67)	83% (60)	80% (55)	75% (15)	40% (8)
Avg. grade	7.75	6.8	7.7	7.63	6.54

Unfortunately, a large number of students that should normally attend the class of groups 4 and 5 showed up in the class of group 3. This lead to an unbalanced number of observations for these treatments. Furthermore, In group 5, more than half of the subjects failed the comprehension test. For these reasons we exclude results from this group from any further analysis.

The treatments used in groups 1 and 2 are the ones that give us some answers concerning the existence of GM types. We therefore focus our analysis on these groups. The results from groups 3 and 4 are relevant to understand the reasons behind a GM type's behavior. We refer to these results when discussing such explanations and the possibility for further experiments.

In each game a subject could submit one of four possible strategies: ("accept when drawing white", "accept when drawing black"), ("reject", "accept"), ("accept", "reject"), ("reject", "reject"). Notice that the first two are not individually rational. Drawing a black ball perfectly reveals the state to be "bad" and hence rejecting is optimal. Only 3 subjects submitted such strategy and of them only one had successfully completed the comprehension test. We choose to ignore these subjects for the rest of the analysis. The other two strategies correspond to informative play and herding.

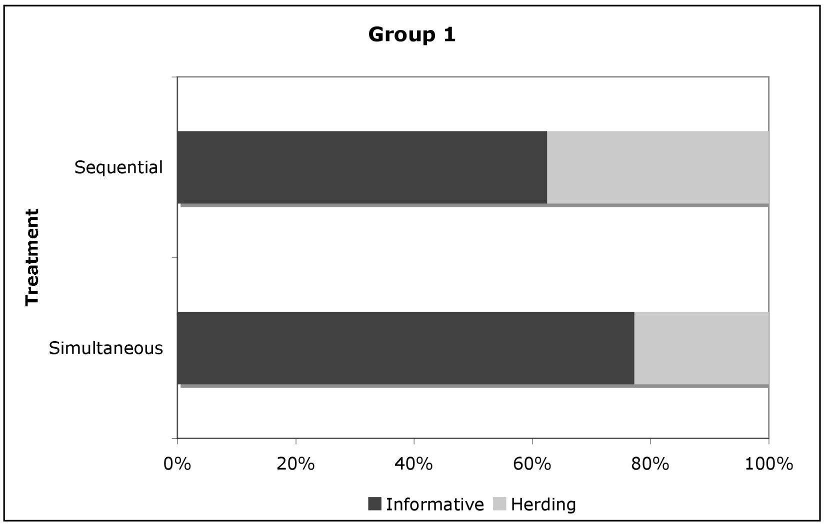
Games with incomplete information are generally known to be complex for subjects. In our case, the fact that the game is played only twice and with no feedback about payoffs gives limited chances for subjects to get familiarized with the game. This is the reason for having subjects take the comprehension test. It is positive that the vast majority of subjects answered this test perfectly. We therefore choose to ignore from the rest of the analysis the subjects that have not answered correctly to one or more questions in the test. Including these subjects would not change any of our results.

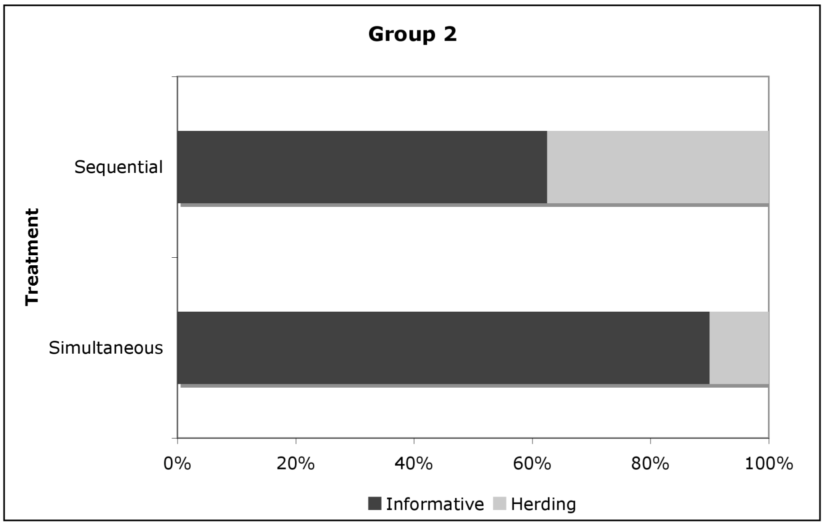
The above exclusions leave us with 66 subjects in group 1 and 60 subjects in group 2. Note that while for treatment 1 (simultaneous) we have observations from all non-excluded subjects, for treatment 3 (sequential) we have observations only for subjects that were matched with players 1's that rejected in the preliminary session. This means that for treatment 3 we have 32 observations in group 1 and 24 observations in group 2.

First we look at subjects behavior in each treatment. The following graphs show the proportion of subjects that played informatively or chose to herd in each treatment for each group.

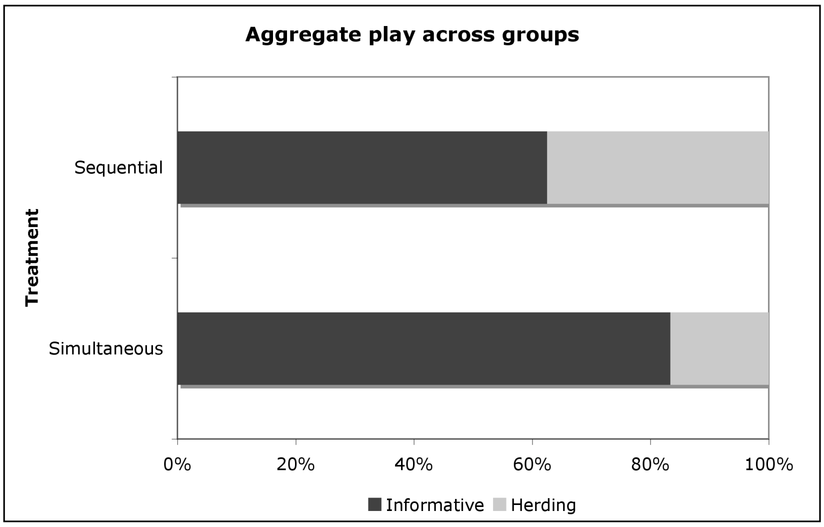
The reason for having subjects in different games play the same games in different order is to control for the possibility of "contamination". That is, playing one type of game first could have a an effect on the play of the second game. It turns out there are no statistically significant differences between the distribution of play in each game in the two groups (p-value of 0.6 and 1 for the simultaneous and sequential game respectively under the two-tailed Fisher's exact test). We shall therefore from now on group all observations together in a single sample.

We now compare play across treatments. We have 126 observations for the simultaneous treatment and 55 for the sequential. The following graph shows the proportion of subjects that play informatively and the ones that herd in each treatment. 40% of subjects herd in the sequential treatment, while only 17% does


Group 1
Treatment
Sequential
Simultaneous
0%
20%
40%
60%
80%
100%
Informative
Herding


Group 2
Treatment
Sequential
Simultaneous
0%
20%
40%
60%
80%
100%
Informative
Herding

so in the simultaneous one. This difference is statistically highly significant (p-value 0f 0.0025 under the one-tailed Fisher's exact test). Herding is the optimal play in both treatments. Still recognizing this in the simultaneous game requires subjects to perform the more sophisticated IIFA. On the other hand, the simpler IIOA is needed to recognize herding as an optimal play in the sequential game. The higher proportion of subjects herding in the sequential game could reflect this difference in complexity among the two games.

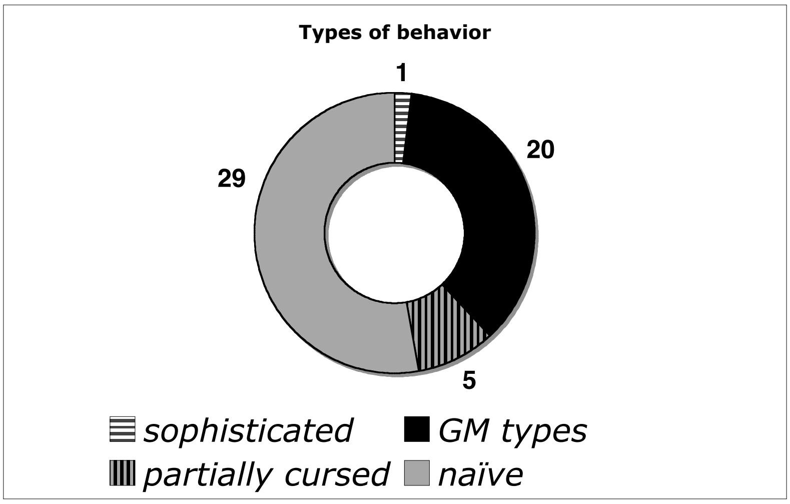


Still, this analysis simply identifies differences in aggregate behavior in each game. Our design allows us to do more than that and address the question of interest: do players behave as GM? To answer this question we look at every subjects behavior in both games. We then classify each subject according to this behavior. There are four classes of behavior. Behavior in three of these can be explained by existing theories. Behavior in the fourth class is the one of a GM type. More than one third of subjects are classified as GM types.

First we must note that for classification we can only use subjects that submited a strategy in both treatments. This excludes subjects that were matched with a player 1 that accepted. Pooling subjects from both groups, this gives us 55 subjects to classify. There are four possible patterns of behavior: {"Informative", "Informative"}, {"Herd", "Herd"}, {"Informative", "Herd"}, {"Herd", "Informative"}, where the first element in the brackets denotes the behavior in the sequential treatment, and the second denotes behavior in the simultaneous treatment. The first pattern, playing informatively in both treatments is the *naive* behavior.

It corresponds to the behavior predicted for fully cursed types and level-1 types by the respective theories. The second pattern, herding in both treatments is the *sophisticated* behavior. It is predicted as the behavior of Bayesian-Nash type players and level-2 players in the level-k reasoning model. The third pattern, informative in the simultaneous and herding in the sequential treatment, is predicted only by the cursed equilibrium theory for *partially cursed* players with an intermediate value of χ, the models parameter. The theoretical basis for such a behavior is not clear. The last pattern, herding in the sequential and informative play in the simultaneous treatment is the GM type's behavior.

The following graph shows the number of subjects that can be classified in each of the four classes. As one can see, the majority of subjects are classified as naive. 29 subjects (53%) enter this class. Only one subject is classified as sophisticated. 5 subjects are classified as partially cursed. Finally, 20 subjects (36%) are classified as GM types. This makes GM types the second largest class in our sample.



4 Discussion

Our first research question is whether GM type behavior is empirically relevant. Given the small number of observations in our sample, one can not claim to have decidedly answered this question. Still, our findings clearly point to the direction of a positive answer. More than a third of our subjects behave in a way that can not be explained by any of the relevant theories of strategic thinking.

While more experiments could reinforce this point it is probably more interesting to study the drivers of such behavior. There are to avenues one can follow to answer this question. The first is to use subjects' self-reported rationale for their behavior. This analysis is work in progress.

The second option is through further experiments. As mentioned already, more experiments were run than the ones reported up to now. These included treatments with different framings of the standard sequential and simultaneous games. The unbalanced show-up rates do not allow us to draw any definite conclusions. Still some insight is gathered.

In group 3 treatments 1 and 2 were used. Treatment 1 is the same version of the simultaneous game used in groups 1 and 2. Treatment 2 is the version of the simultaneous game in which subjects are reminded that their actions only matters when player 1 rejects. There were 69 subjects in the group, out of which 55 answered the comprehension test correctly. In treatment 1, 44 played informatively while 11 chose to herd. In treatment 2, these numbers were 35 and 20 respectively. The increase in the number of players that herd in treatment 2 is statistically significant (p-value=0.004).

This finding suggests that for at least some of the subjects playing informatively, a behavior that is naive, the reason is a failure to realize that given the structure of the game their action only matters when player 1 rejects. This is the first step necessary in the IIFA reasoning process. Once they are reminded of this, as is done in treatment 2, they manage to perform the remaining steps of the reasoning by themselves. If this is so, then failure to perform IIFA is because of the complexity of the game and not because of the inability to infer the information that drives other's actions. Note that it is this last part that is the basis for the notion of a "cursed equilibrium".

In group 4, treatment 1 was combined with treatment 2+. This last treatment basically applies an additional layer of the strategy method to treatment 3. Subjects are told that any choice they make is to be made after observing player 1's choice. Since no choice is to be made when player 1 accepts, subjects are asked to submit their strategy (conditional on their draw) conditional on the fact that player 1 rejects. One could argue that this treatment simply consists on a change of framing but is otherwise equivalent to the game in treatment 1 and 2.

Unfortunately only 20 subjects showed-up in class where the experiment took place and out of them only 15 answered the comprehension test correctly. 3

subjects chose to herd in treatment 1, while 11 did so in treatment 2+. Although the sample is very small, the increase in the number of subjects herding is statistically significant.

Note that although one can argue that the games in treatment 2 and 2+ are equivalent, there is a difference at least in the framing. Although in neither game do subjects actually observe player 1's behavior, in treatment 2+ they condition their action on an observation. In treatment 2 they play without expecting to observe player 1's action.

Given the results in groups 3 and 4, although no conclusions can be drawn, the following question is born: How much of the GM types' behavior can be explained by a failure to understand the complexity of the game and how much comes from a failure to infer information from actions that are not observed (or not expected to be observed)? Having subjects play both treatments 2 and 2+ could help give an answer. Further experiments are needed for this.

5 Conclusions

Incomplete information characterizes a significant number of economic and social situations. It is therefore important to have a model of individuals' behavior in such situations. Bayesian Nash equilibrium concepts from classical game theory have provided a useful starting point. Nevertheless, situations like the appearance of the winner's curse in common value auctions demonstrate their possible limitations. Alternative theories have been advanced to explain these phenomena, including "cursed equilibrium" and "level-k" thinking. These theories offer interesting insights on the possible drivers of individual behavior in such environments. Still, the results in this paper show that they fail to capture an otherwise quite intuitive point that is crucial in games with incomplete information: observing others' actions is not the same as predicting they will happen. And therefore, inferring their informational content is "easier" in the first case than in the second.

Although we identify a type of behavior that is not predicted by any existing theory, we do not provide a theory to explain it. Before doing so we must identify the drivers of such behavior and we already plan experiments that can give us answers in that direction. This can be the first step in developing a more complete theory of strategic thinking for situations of incomplete information with a common value.

The experimental designs used to study the winner's curse are commonly based on variations of auctions and the "company acquisition" game. Here we introduce a third alternative. We take advantage of the possibility to directly contrast behavior in a simultaneous action game with that in a sequential action game. But the fact that agents in this model only face a binary choice, allows to better control for complexity as a determinant factor. Given the continuing interest in studying the winner's curse we think that the design we introduce can serve as an additional alternative to be used in related experiments.

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A Instructions

The next pages contain a sample of the original instructions used in the experiment. A translated version follows. During the experiment instructions were read out loud and subjects were asked not to turn pages unless instructed to do so.

Nombre:___________________________

DNI:______________________________

Vas a participar en un experimento económico sobre la toma de decisiones. Dependiendo de tus decisiones podrás ganar dinero.

Primero tienes que leer y entender bien las instrucciones. Tienes que demostrar que has entendido bien contestando a unas preguntas tipo test. Si contestas mal a las preguntas no puedes ganar dinero.

El experimento tiene 2 partes. En cada una te enfrentarás a una oferta y tendrás que tomar alguna decisión. Al final tienes que contestar unas preguntas adicionales.

Para determinar si ganas dinero, se escogerá aleatoriamente una de las dos ofertas y podrás ganar dinero en base de tus decisiones en esta oferta. Para saber si has ganado podrás consultar una lista con los ganadores que será colgada en el "Aula Global" de esta asignatura. Para ser pagado puedes pasar por el despacho 20.134 el Viernes 10/6 entre las 10.30-13.30 y 15.00-17.00. Es importante que lleves tu DNI y que los datos correspondan con los que has apuntado en esta hoja.

OFERTAS:

Tu y otro participante seleccionado al azar os encontráis con la siguiente oferta. Se os ofrece una bolsa que contiene 10 bolas. Podéis aceptar o no la bolsa. La bolsa puede ser "**buena**" (contiene solo bolas blancas) o "**mala**" (contiene algunas bolas negras). Hay un 50% de probabilidad que la bolsa sea buena o mala.

El otro participante tiene prioridad: dado que solo hay una bolsa si el la acepta, tu te quedas sin bolsa. Si el la rechaza y tu la aceptas te la quedas tu. Si los dos rechazáis la bolsa no la tendrá ninguno de los dos.

Los pagos dependen de si uno tiene la bolsa y si esta es "buena" o "mala". Si tienes la bolsa y es "buena", ganas 2 euros y si es "mala" no ganas nada. Si no tienes la bolsa y esta resulta ser "buena", no ganas nada. Si no la tienes pero resulta ser "mala", ganas 2 euros.

Si la bolsa es...:	**...buena**	**...mala**
si la tienes	***2***	*0*
si no la tienes	*0*	***2***

Antes de decidir, podrás sacar una bola de la bolsa y comprobar si es blanca o negra. Lo mismo hará el otro participante. Recuerda que si la bolsa es "buena", solo contiene bolas blancas. Por eso, si uno saca una bola negra, la bolsa tiene que ser "mala".

Preguntas de entendimiento:
Cada pregunta tiene una solo respuesta correcta. Marca tu respuesta poniendo en circulo la letra correspondiente.

1. *Si los dos aceptáis la bolsa:*
a. Te la quedas tu y ganas 2 euros si es “buena”.
b. Se la queda el otro y ganas 2 euros si es “buena”.
c. Te la quedas tu y ganas 2 euros si es “mala”.
d. Se la queda el otro y ganas 2 euros si es “mala”.

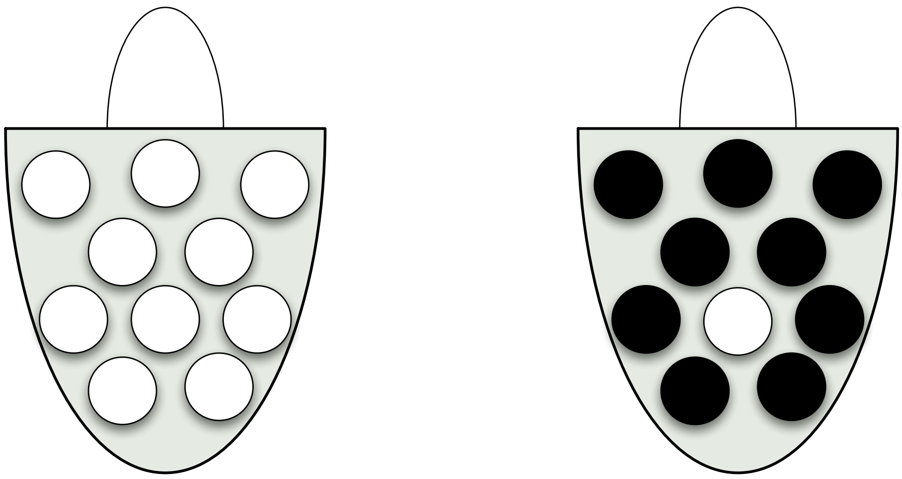
2. *Si tu aceptas y el otro participante rechaza:*
a. Te la quedas tu y ganas 2 euros si es “buena”.
b. Se la queda el otro y ganas 2 euros si es “buena”.
c. Te la quedas tu y ganas 2 euros si es “mala”.
d. Se la queda el otro y ganas 2 euros si es “mala”.

3. *Si rechazáis los dos:*
a. No se la queda nadie y ganáis 2 euros si es “mala”.
b. Te la quedas tu y ganas 2 euros si es “buena”.
c. No se la queda nadie y ganáis 2 euros si es “buena”
d. Se la queda el otro y ganas 2 euros si es “mala”.

4. *Si uno saca una bola de la bolsa y esa es negra:*
a. Sabe que la bolsa tiene que ser “mala”.
b. Sabe que la bolsa tiene que ser “buena”.
c. No sabe con certidumbre si la bolsa es “buena” o “mala”.
d. Sabe que hay más probabilidad que la bolsa sea “mala”.

5. *Si uno saca una bola de la bolsa y esa es blanca:*
a. Sabe que la bolsa tiene que ser “mala”.
b. Sabe que la bolsa tiene que ser “buena”.
c. Sabe que hay más probabilidad que la bolsa sea “buena”.
d. Sabe que hay más probabilidad que la bolsa sea “mala”.

El siguiente dibujo muestra el posible contenido de la bolsa si es buena o si es mala.



Buena
Todas las bolas son blancas

Mala
9 bolas son negras

Hay la misma probabilidad que la bolsa sea buena o mala. Sacarás una bola de la bolsa para comprobar si e blanca o negra. Lo mismo hará el otro participante.

OFERTA 1

En esta oferta participas junto al participante ## del otro grupo que ha sido escogido al azar. El tiene prioridad, pero tu tienes que tomar tu decisión sin observar la suya.
¿Que decisión tomarás? Aceptarás o rechazarás la bolsa?

(pon en circulo tu respuesta)

Si la bola que sacas tu es blanca: **Acepto** **Rechazo**

Si la bola que sacas tu es negra: **Acepto** **Rechazo**

OFERTA 2

En esta oferta participas junto al participante **##** del otro grupo que ha sido escogido al azar. El tiene prioridad, y observas que decide **RECHAZAR** la bolsa.

¿Que decisión tomarás? Aceptarás o rechazarás la bolsa?

(pon en circulo tu respuesta)

Si la bola que sacas tu es blanca:	**Acepto**	**Rechazo**
Si la bola que sacas tu es negra:	**Acepto**	**Rechazo**

PREGUNTAS

1. ¿Porque has tomado la decisión que has tomado en la oferta 1?

____

____

____

____

____

2. Si has cambiado de decisión en la oferta 2 ¿Porque lo hiciste?

____

____

____

____

____

3. ¿Cuál ha sido tu nota de selectividad?____________________

Name:_________________________

ID:____________________________

You will participate on an experiment on decision making. Depending on your decisions, you may win cash.

First you must read well the instructions. You must prove that you understand them by answering a set of multiple choice questions. If you do not answer correctly you can not win any money.

The experiment has two parts. In each one you will face an offer and you will have to make a decision. In the end you must answer some aditional questions

In order to determine whether you have won cash, one of the two offers will be chosen randomly and you may win depending on your decision in that offer. To find out whether you have won you can check a li st with the winners that will be posted on the classe's intranet. In order to get payed you must come by office 20.134 on Friday 10th of June between 10.30-13.30 and 15.30-17.00. It is important to bring with you your ID containing the details that you have used on this sheet.

OFFERS:

You and another participant that has been selected randomly, face the following offer. You are offered a bag containing 10 balls. You may accept o reject the bag. The bag may be **"good"** contains only white balls) or **"bad"** (contains some black balls). There is a 50% chance that the bag is either "god" or "bad".

The other participant has priority: given that there is only one bag, if he accepts it you are left without the bag. If he rejects it and you accept, you get it. If you both reject the bag, neither one gets it in the end.

Payoffs depend on whether one has the bag and whether it is "good" or "bad". If you have the bag and it is "good", you win 2 euros and if it is "bad" you win nothing. If you do not have the bag and it turns out to be "good", you do not win anything. If you do not have it and it turns out to be "bad", you win 2 euros.

If the bag is...	...good	...bad
if you have it	***2***	*0*
if you do not have it	*0*	***2***

Before deciding, you will draw a ball from the bag and check whether it is black or white. The other participant will do the same. Remember that if the bag is "good", it only contains white balls. Therefore, if one draws a black ball, then the bag must be "bad".

Test of understanding:

There is a single correct answer to each question. Mark you answer by putting a circle around the corresponding letter.

1. *If you both accept the bag:*

a. You keep it and you win 2 euros if it is “good”.
b. The other one keeps it and you win 2 euros if it is “good”.
c. You keep it and you win 2 euros if it is “bad”.
d. The other one keeps it and you win 2 euros if it is “bad”.

2. *If you accept and the other one rejects:*

a. You keep it and you win 2 euros if it is “good”.
b. The other one keeps it and you win 2 euros if it is “good”.
c. You keep it and you win 2 euros if it is “bad”.
d. The other one keeps it and you win 2 euros if it is “bad”.

3. *If you both reject:*

a. Nobody keeps it and you win 2 euros if it is “bad”.
b. You keep it and you win 2 euros if it is “good”.
c. Nobody keeps it and you win 2 euros if it is “good”.
d. The other one keeps it and you win 2 euros if it is “bad”.

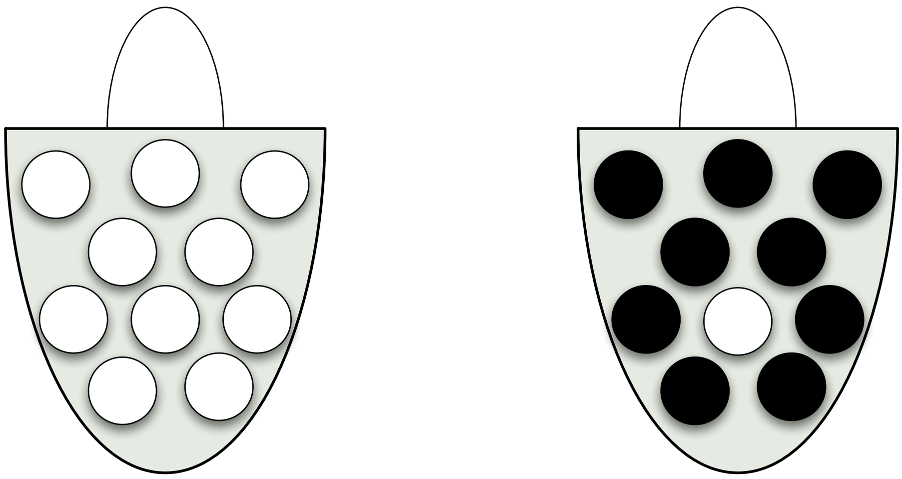
4. *If one draws a ball and it is black:*

a. He knows that the bag is “bad".
b. He knows that the bag is “good".
c. He does not know for sure whether the bag is “good” or “bad”.
d. He knows it is more likely for the bag to be “bad”.

5. *Si uno saca una bola de la bolsa y esa es blanca:*

a. He knows that the bag is “bad".
b. He knows that the bag is “good".
c. He knows it is more likely for the bag to be “good”.
d. He knows it is more likely for the bag to be “bad”.

The following drawing depicts the possible content of the bag in case it is “good” and in case it is “bad”.



Buena
Todas las bolas son blancas

Mala
9 bolas son negras

It is equally likely that the bag is “good” or “bad”. You will draw a ball from the bag and ckeck whether it is black or white. The other participant will do the same.

OFFER 1

In this offer you participate together with participant no. ## from the other group which has been selected randomly. He/she has got priority, but you must take your decision without observing what he decides to do.
What will you do? Do you accept or reject the bag?

(put a circle around your answer)

If the ball I draw is white: **I accept** **I reject**

If the ball I draw is black: **I accept** **I reject**

OFFER 2

In this offer you participate together with participant no, ## from the other group that has been selected randomly. He/she has got priority and you observe that he/she decided to **REJECT.**
What will you do? Do you accept or reject the bag?

(put a circle around your answer)

If the ball I draw is white:	**I accept**	**I reject**
If the ball I draw is black:	**I accept**	**I reject**

QUESTIONS

1. Why did you take the decision above in offer 1?

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2. If you changed your decision in offer 2, why did you do it?

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3. What has been you university entry grade?____________________