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Eliciting Social Networks: an Experimental Approach

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Abstract

This work presents the design of a mechanism to elicit latent social networks. Subjects are invited to reveal their friends' names, together with a "strength" (from acquaintance to friend) measuring the valuation of the relationship. According to the mechanism, subjects are rewarded with a fixed price either a) if the strengths of a randomly selected mutual link are sufficiently close or b) if they do not nominate anybody (our "exit-option" close). Our main results are that i) a very large percentage of links (72%) are reciprocated (99% of those with the required accuracy); ii) the mechanism largely captures strong friendship relations and practically ignores weak relations and iii) the accuracy of the elicitation mechanism is robust to the different reward means.

Keywords: friendship, networks, experiments, psychological games.

JEL Classifications: C93, D85, Z13

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1 Introduction

In laboratory experiments anonymity is usually imposed. The main reason is that in the laboratory the experimenter wants to control all variables involved. So, if the experimenter cannot control the relationship between participants, it is preferable to impose anonymity. However, many economic interactions are not anonymous, and there is an emerging literature which links economic and sociological methodologies to test in the lab how "real-life" social links affect behavior in classic protocols, such as Dictator Games.[1]

On the other side, there is a growing literature which highlights the importance of the *structure* of *social networks* in our social and economic life. These works explore experimentally how social networks influence people's behavior in a wide variety of economic settings, from job search to information transmission within a firm.[2] Consequently, being able to properly map the structure of a network becomes crucial in understanding how the network structure influences individual behavior and, vice versa, what is the impact of individuals' decisions on the social network's structure and performance.

Most of the existing literature does not deal with "real" networks; in sharp contrast there is number of papers with *exogenous* networks, that is, structures which are formed ex-ante outside agents' active control (see, for instance, Calvó-Armengol and Jackson [9]) while for others the induced network structure is *endogenous*, since agents' strategy decisions include link creation (e.g. Kranton and Minehart [25]).

The fact that the experimental literature on networks has mainly focused on endogenous networks may come from *the difficulty of measuring the structure and strength of social relationships in real-life contexts.*[3] To the best of our knowledge, the seminal paper in the economics literature which proposes

[1] See Leider et al. (2007), Brañas et al. (2007) or Goeree et al (2007).

[2] For example Montgomery [27], Granovetter [21] or Calvó-Armengol and Jackson [9], deal with job search through social contacts; Bloch [3] and Goyal and Moraga [19], develop models of collusive alliances among corporations; Kranton and Minehart [25] and Wang and Watts [33], analyze trade in decentralized markets; Goyal and Vega-Redondo [20] analyze the dynamics of network formation in coordination games.

[3] Examples of the experimental research with endogenous networks include coordination networks (see Berninghaus et al. [2] or Corbae and Duffy [13]); cooperation networks (see Kirchkamp and Nagel [23], Cassar [10] or Riedl and Ule [30]); buyer-seller networks (see Charness and Corominas-Bosch [11]) network formation (see Callander and Plott [8], Falk and Kosfeld [15] or Vanin [32]). For a survey on these network experiments, see Kosfeld [24].

a mechanism for network elicitation, is that of Leider, Mobius, Rosenblat and Quoc-Anh [26] (LMRQ, hereafter).[4] They develop a network elicitation protocol with the following rules:

1. participation was voluntary, with recruitment conducted via the internet; also, the performance was done through a webpage.

2. the mechanism was a coordination game by which each subject had to pick up the name of her friends from a list of students in two dorms, together with an estimate of the time spent together with each of them;

3. all links would be checked, yielding a price of 50 cents with 50% probability for any mutual link, and nothing otherwise. In case the difference in the reported time spent together (per week) was not higher than one hour, the probability of winning the price would raise to 75%.

In other words, LMRQ's protocol is meant to map a social network "as dense as possible", since expected monetary rewards are increasing in the number of nominated friends. As a consequence, *i*) the average number of links per subjects was relatively high (10), while *ii*) the frequency of mutual links was relatively low (37%), even if *iii*) in case of mutual links, subjects coincided in the time they spend together ($\pm\frac{1}{2}$ an hour) 80% of the times.[5]

LMRQ's challenging results motivated this paper, whose aim is, again, to use economic incentives to induce subjects to reveal the complex network underlying social relations of their undergraduate class. Our aim is to complement the mechanisms proposed by LMRQ in the following dimensions.

a) First, we were concerned with simultaneous play, in the sense that subjects could not agree to name each other during the experiment. However, this implies that we have to ensure *full participation* of the subject pool under investigation. This is why, for the experiment reported in this paper, recruitment was not voluntary, but all the evidence

[4] Abbink et al. [1] allowed subjects to sign up for the experiment only if they did as a pair. Reuben and Winden [29] also used this procedure in a three-player power-to- take game for comparing a 'strangers' treatment with a 'friends' one. See also Brañas-Garza and Espinosa [5] and Goeree *et al.* [18] for other examples of social network elicitation.

[5] Actually, the average number of elicited links was over 10 because LMRQ only consider the 10th first names, given that subjects spend half an hour or more in selecting in the list the name of their 11th friend.

has been collected during regular teaching sessions (or even during final exams, see details below). The motivation for this choice comes from the fact that voluntary recruitment could carry self-selection issues that may have affected the network mapping through channels outside our control. Voluntary participation was still ensured by the fact that all subjects were asked to give their written consent (and, therefore, they could still refuse to participate to the experiment).[6]

b) On top of the standard written permission, we designed a protocol by which subjects could enjoy an "exit option" *built in the same system of incentives.* By this exit option, *subjects could* ***ensure*** *the maximum material payoff by simply abstaining to name any friend.* The reason of introducing this option was twofold. Firstly, we wanted that subjects have no incentives to nominate a false friend. As they are risking a sure payoff, once subjects decide to nominate someone, it is very unlikely they do not report true relationships. In addition, and given we did not opt for a voluntary recruitment, it could be the case that some students have no friends in the class (because they belong to a different group or a different course year but assist to the that class group for schedules constraints). We could not punish those students for not having friends in the class.

c) In addition, given LMRQ evidence, we were also concerned that the mechanism itself would not provide incentives to overstate their social network. This is the reason why, unlike in LMRQ, in case of multiple links, *only one would be checked at random* (and rewarded if reciprocated with sufficient accuracy). Thus, subjects should be concerned about coordination rather than the number of links.

d) Finally, we wanted to test the robustness of our mechanism to changes in rewards. Our baseline treatment, TP, involves the use of an extra-credit point in the final exam, certainly a very valuable reward for the social network under consideration.[7] In addition, we also run two other

[6]Something that indeed happened for 13% of our subject pool in TN (see details in Section 4).

[7]In treatment TP the prize was 1 extra-credit point for the exam of Microeconomics II (grading scale: 0-10, pass with 5). In Spain, students pay tuition fees by exams. The fee for a subject of 6 "credits" (1 credit = 10 hour), such as Micro II, at the University of Granada is approx 60 euros. Given past exam history, we can estimate in approximately

treatments: one, TM, with monetary rewards (5 euros) and another, TN, with no rewards at all. The aim of the latter treatment is therefore, to test *the necessity of using a mechanism to elicit social networks* (as opposed to a simple questionnaire or a survey).

We shall here briefly summarize our experimental findings. First, the relative frequency of mutual links was extremely high (75% were reciprocated, 99% of which with the required accuracy); *ii*) very few subjects (nobody in treatment TP and 7.14% in TM) chose not to name any friend; *iii*) all subjects had at least one link reciprocated "exactly", and *iv*) the average number of links per subject was 4.5. This result is basically stable across treatments TP and TM (i.e. across different reward means), while in treatment TN (no rewards) less than 5% of links were reciprocated. Those results, jointly with the fact that 13% of subjects in TN didn't sign the authorization to use their data of the experiment, highly support the necessity of a mechanism to map social ties properly.

The remainder of the paper is arranged as follows. Section 2 describes the experimental design and procedures. Section 3 reports the experimental results we just summarized, while Section 4 contains some final remarks and guidelines for future research. This is followed by an Appendix containing the experimental instructions.

2 Experimental design and procedures

The mechanism

The basic structure of our elicitation protocol is as follows. We asked students to reveal the names (and surnames) of their friends within their undergraduate class, jointly with a valuation (strength) of each relationship which ranged from 1 to 4.[8]

15% the ex-ante probability for a student to get a note from 4 to 5 (that is, a note for which the extra point would be crucial to pass the exam) and another 5% the ex-ante probability of receiving a note from 8 to 9 (that is, a note for which 1 grade more would imply Distinction, which in Spanish university implies 6 credits for free in the following Academic Year). As rough as this calculation is, this sums up to a 20% probability of the extra-point being worth 60 euros, with an expected benefit of $0.2 \times 60 = 12$ euros.

[8] Note that in Spain, individuals have always two surnames instead of only one as is usual in many countries.

Let s_{ij} define the strength given by i to the ij relationship, framed in the experimental instructions as follows:
$s_{ij} = 1$: j is a person i hardly knows;
$s_{ij} = 2$: j is an acquaintance of i;
$s_{ij} = 3$: j is a friend of i;
$s_{ij} = 4$: j is a close friend of i.

Finally, if subject i does not name subject j, we set $s_{ij} = 0$.

As for the outcome function of the mechanism, subjects would receive a prize if one of the following two cases holds:

- CASE 1: They did not name anybody, or
- CASE 2: They named at least one subject, and all of the following three rules are satisfied:

Rule 1 One out of the elicited links would be selected at random (each link selected with equal probability). Let $\hat{j}$ denoting the subject named by the randomly selected link;

Rule 2 Subject i would receive the price only if also $\hat{j}$ has named her (i.e. only if $s_{i\hat{j}} \neq 0$);

Rule 3 The friendship strength should also be *accurate*, in the sense that the difference in strengths was not higher than 1: $D_{i\hat{j}} = |s_{i\hat{j}} - s_{\hat{j}i}| \ \leq 1$.

CASE 1 corresponds to the "exit-option" clause we mentioned in the introduction; CASE 2 to the coordination protocol similar to that of LMRQ.

Treatments

As we just mentioned, we conducted three treatments which differed only about the nature of rewards: extra-credit points (TP), monetary (TM) and no incentives (TN). In the 3 TP sessions, subjects could gain an additional point (out of 10) in a final "bonus question" of the exam. To check the robustness of our results to the change in rewards, we also run 2 additional sessions, one -treatment TM- using a monetary prize (5 Euros); another -treatment TN- using no reward at all. Instructions of all treatments were identical, except for the description of the outcome (reward) function. A copy of the instructions is available at the appendix.

Subjects

All sessions were non-computerized classroom experiments conducted with subjects with no (or minimal) prior exposure to game theory. The 3 TP sessions were conducted in June 2004, during the exam of Microeconomics II, a first-year undergraduate course in Economics, at the University of Jaen, Spain. We included a "special question" as an additional item of the final exam. We ran the experiment with three different classes: Net 1 and 2, from the Degree in Business Studies, and Net 3, from the Degree in Law and Business. These three groups consisted in 51, 53 and 31 students respectively. The TM session (Net 4) was conducted in February 2006 at the University of Granada. The group was compounded of 39 students from Microeconomics I, a first-year course in Economics. The TN session (Net 5) was conducted also at the University of Granada in February 2006. The sample was 40 students from Microeconomics I, a first-year course in the Business Administration program.

The format of the classroom experiment was chosen to ensure maximal participation of the social networks under scrutiny. If subjects nominated friends or acquaintances who were not present in the sessions, the corresponding links have been removed from the network, since correspondence could not be checked.[9] This problem is due to simultaneous play in our experimental design. This feature has the advantage that subjects could not agree to nominate each other during the experiment. The main disadvantage is that we could only considered present subjects as network nodes.

3 Results

We shall organize the presentation of our experimental results around two main questions, which we now address.

[9] As for the TP sessions, in Net 1 (2) [3] we removed 10 (8) [12] links out of a total number of 175 (160) [289], that is, a percentage of 5.7% (5%) [4%] respectively.

The rate of link removal for the TM and TN sessions, Net 4 and Net 5, were much higher (both around 19%). This is because they were conducted during a regular lesson; given that they were not run within an exam, maximal group attendance could not be guaranteed.

Q1. How does our mechanism work?

Our first concern is about the efficacy of our protocol to obtain mutual links. The reason is that we think that the percentage of symmetric links is a measure of the performance of the mechanism. The probability that two subjects nominate each other with an accurate strength at random is negligible. Therefore, if the rate of mutual links captured by our mechanism is high, we may think that most of the links are true relationships.

We are also interested in looking at the extent to which the differences in the design, compared with LMRQ, translate into differences in the estimated network characteristics. Recall that the main difference (besides the exit option) between our mechanism and LMRQ's device is that we give lower incentives to name many friends (since only one randomly selected link is payoff relevant, instead of all). Therefore, we expect our mechanism to capture strong relations (i.e. friendships, rather than acquaintances), with the average elicited links lower than in LMRQ.

Table 1 looks at the efficacy of our mechanism in reporting mutual links in the five networks under consideration, that is, three networks collected under treatment TP, Net 1, Net 2 and Net 3 with 53 (289 links), 51 (165 links) and 31 (152 links) subjects respectively, and the two networks, Net 4 and Net 5, collected under the control treatments TM and TN, with 39 (102 links) and 40 subjects (103 links) respectively.[10]

In Table 1, the first three columns correspond to data from TP. Column forth, *Aver(1-3)*, is an average of the previous three networks of TP. Last two columns correspond to TM and TP, respectively. The number of mutual links in each network are divided into three different categories according to the difference in strength of the links (D = 0, D = 1 and D > 1). Notice that mutual links in the fourth row of Mutual (Total) are the ones which fulfilled Rule 2 of the mechanism. Column *Not Mutual* corresponds to those links which were not reciprocated.

[10] In this section, we only present the analysis of the data from the point of view of links. However, we have also analyzed mutual links from the point of view of individuals, that is per capita, which are also relevant to answer questions Q1 to Q3. Results are very similar and are available upon request.

		TP				TM	TN
		Net 1	Net 2	Net 3	Aver(1-3)	Net 4	Net 5
Mutual	D = 0	180	82	98	120	37	3
	D = 1	34	31	16	27	33	2
	D > 1	6	2	0	3	0	0
	Total	220 (76%)	115 (70%)	114 (75%)	150 (74%)	70 (69%)	5 (5%)
Not Mutual		69	50	38	52	32	98
TOTAL		289	165	152	202	102	103

Table 1. Correspondence within the 5 networks

From Table 1, we can state that almost 74% and 69% of the links are reciprocated in TP and TM respectively, while only a reduced 5% of the links are corresponded in TN. Hence, we do not focus on TN.

Result 1. *An average of 72% of the links of the network are mutual in TM and TP.*

Note that this percentage is very remarkable. In addition, the percentage of mutual links with a sufficiently small difference in strengths from bidirectional links ($D_{ij} \leq 1$) is also very high:

Result 2. *An average of 99% of the mutual links have a strength distance $D_{ij} \leq 1$ in TP and TM.*

To study the main features of the obtained networks, we also focus on the strength of elicited links and their relative accuracy. Figure 2 reports the relative frequency of each strength s_{ij} across the three experimental treatments.[11]

[11] The displayed frequency of TP is an average of the three sessions conducted for this treatment. As results in the three sessions of TP are very similar, we think that the average is a good approximation.

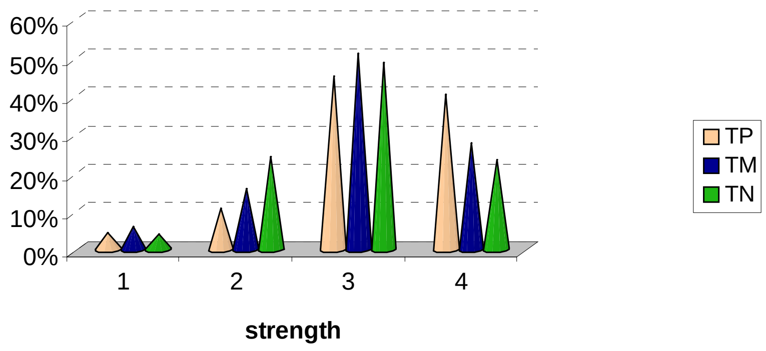

Figure 2. Strength

As Figure 2 shows, the number of links associated to 'acquaintance' relations ($s_{ij} = 1$ and $s_{ij} = 2$) in TP is very small (4% and 11% over the total, respectively). Moreover, the frequencies of links associated to 'friendships' ($s_{ij} = 3$) and 'close friendships' ($s_{ij} = 4$) are very similar (45% and 40% respectively).

Regarding TM, Figure 2 shows that the links associated to 'acquaintance' relations is also reduced (around 22% over the total). However, in this treatment, frequencies of links $s_{ij} = 3$ and $s_{ij} = 4$ are a little bit different (50.9% and 27.5% respectively). This evidence is summarized in the following

Result 3. *Our mechanism largely captures "friendship" relations (some 82%) and practically ignores "acquaintance" relations.*

Figure 3 reports the relative frequency of links *per capita* in our three experimental treatments. In the x-axis *10+* refers to subjects who sent 10 or more links.

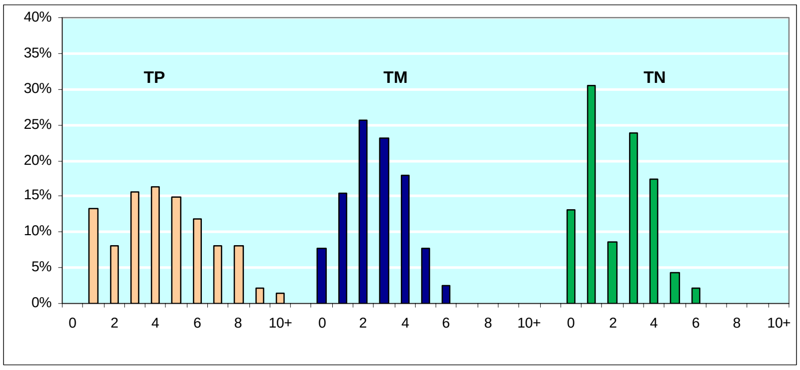

Figure 3. Links per capita

Note that in TP the distribution of links is more uniform than in TM. Also, the maximum number of links is higher in TP than in TM. The latter might be due to how subjects perceive the strength of incentives. In sharp contrast, about half of the subjects involved in TN named 1 or 0 friends.

Result 4. *Links per capita range in TP from 1 to 15, with an average of 4.49. For TM the range is from 0 to 6, with an average number of links of 2.26.*

This result contrast with the average of 10 friends elicited by LMRQ. The reason might be that as in our mechanism, subjects are taking a risk if they nominate someone, they prefer to name only a few friends. On the contrary, in LMRQ setting, the expected payoffs are increasing in the number of friends elicited.

As Figure 4 shows, only a marginal proportion of subjects, 7% in TM (3 out of 42) and 0% in TP, opted for the safe option of naming no friends, assuring the prize.

Result 5. *All subjects revealed at least 1 link in TP and only 3 subjects decided to name no friends in TM.*

To sum up, we observe that nobody in TP and a very reduced percentage in TM decided to play the weakly dominant strategy.

From Result 6, the following question arises: Do subjects feel ashamed of saying they have no friends and then they always nominate someone?

The 174 participants in TP and TM, who nominated at least one link, were reciprocated at least once. This result let us conjecture that subjects did not choose any partner randomly.

Q2. Differences in the three treatments?

This issue may be split into two different questions:

Q2.1. Is it required a mechanism?

Table 2 compares results between a session run with no incentives (TN), the average of the three sessions conducted with extra-credit point reward (TP) and the treatment with monetary incentives (TM).

	N	L	mutual	D<2	no name	no perm.	%3,4 (mutual)	%1,2 (mutual)
TP	45	202	74%	98%	0%	0%	85%(80%)	15%(38%)
TM	39	102	69%	100%	7%	0%	78%(79%)	22%(32%)
TN	40	103	5%	100%	13%	13% (6/46)	72%(5.4%)	28%(3.4%)

Table 2. Link correspondence across treatments

where, N is the average number of subjects, L is the total number of sent links, *mutual* is the percentage of symmetric links, $D = 0$ is the percentage of links corresponded with strength distance 0 from the mutual links, $D < 2$ is the percentage of links with $D_{ij} \leq 1$ from the mutual links, *no name* is the percentage of subjects who sent no links, *no permission* refers to the percentage of people who did not sign the authorization to use their data of the experiment (obviously, they did not name anybody or give their own name), and *%1,2(mutual) [%3,4(mutual)]* is the percentage of sent links with strength 1 or 2 [3 or 4] (from those, the percentage of mutual links).

Table 2 supports the above considerations about the potential problems which can emerge when using no incentives (not to reveal private information or not to take the task very seriously). On one hand, related to the problem that subjects are not willing to reveal private information, 13% (6 out of 46 subjects) did not allow us to use the information requested in the experiment. On the other hand, the second result shows the amazing high difference in the percentage of mutual links, 5% in TN as against 74% in TP.

Result 6. *If incentives are not provided, the obtained network seems to be unrealistic (5% of mutual links) and less rigorous than if an appropriate mechanism is used (74% of mutual links).*

Q2.2. TP *versus* TM

Now, we compare the treatment with points (TP) with those data generated with monetary rewards (TM). TP and TM share most of the features. Table 2 shows the main results for the two treatments.

Observe that the percentage of mutual links in both treatments is very similar. Moreover, results referring to the accuracy of mutual links, that is the $D<2$ variable is also analogous for both treatments.

Monetary rewards have not a strong effect in the choice of the exit option (not to nominate anyone) since the percentage of subjects with 0 links in this treatment is only 7%.

Finally, Table 2 shows that the percentage of friend and acquaintance relationships is very similar in both treatments (78% vs 85% for friends and the complementary for acquaintances), as well as the correspondence percentage (79% vs 80% for friends and 32% vs 38% for acquaintances). Hence, both incentive rewards report similar results. In both TP and TN, we capture mainly 'strong' relationships.

Result 7: *The percentage of mutual links is very similar with different incentives as well as the high percentage of 'strong' relations elicited.*[12]

4 Discussion

In this paper, we propose an elicitation mechanism tailored to the specific features of the social environment object of study. Given the structure of the mechanism, the main problem that may appear from a theoretical point of view, is that the weakly dominant strategy of this game under selfish preferences is to name zero friends, assuring the payoff.

Results obtained show that, instead of playing the weakly dominant strategy, almost all subjects name at least one link and the rate of correspondence

[12] However, monetary incentives seem to be a bit stronger because there is a percentage of 7% who do not nominate anybody contrasting with 0% with grade incentives. In addition, subjects are more strategic when nominataing their friends in the TP treatment, and thus the percentage of links with strength 3 is quite higher than with 4.

in elicited links is remarkably high. That means that players prefer to take the risk of loosing their final payoffs, contradicting the behavior predicted by theory under egoistic preferences.

However, those results coincide with the predicted behavior, not under selfish preferences, but taking into account other regarding preferences. There is now considerable evidence indicating that many people are not only interested in their own material payoffs but that they are motivated by other concerns as well. Results obtained are not contrary to the behavior predicted by most of the economic models of "social preferences" recently developed. Our intuition is that subjects with this kind of preferences will nominate each friend thinking that friend will also nominate them.

Taking the utility function proposed by Fehr-Schmidt (1999), the strategy of naming no links is not a weakly dominant strategy, because subjects may feel guilt if they get higher payoffs than their partners. With ERC model by Bolton and Ockenfels (2000) not naming anybody is neither a weakly dominant strategy.

Looking at models of interdependent utilities (see for example de Martí, 2007 or Sobel, 2005), naming zero friends is not a weakly dominant strategy. The reason is that in these models, subjects' utilities depend not only on her own payoffs, but also on others' utilities. So, this game has eleven equilibria but no equilibrium is weakly dominant.

Therefore, although the theoretical prediction of behavior under selfish preferences tell us that the mechanism is not good, predictions of models of "social preferences" and results obtained in the experiment, show that the proposed mechanism actually works.

Besides the high rate of mutual links, we also notice a network architecture that privileges strong links as a result of the specific incentive structure. This result is also encouraging, as it gives room for the social scientist to fine-tune the (incentive) protocol to the different characteristics of the social network, that, depending on the issue at stake, may be considered as more relevant. Our results also appear to be robust across different reward means. This, again, provides more flexibility to adapt the mechanism to other social contexts similar to ours. On the other hand, our study shows the need for the use of economic incentives for this kind of exercise, as our treatment without rewards, TN, showed remarkably different results. Interestingly, Goeere *et al.[18]* found a coordination around 50% within a subject pool of children using a survey. This may be due to the fact that children are less prone to lie or that the "demanding effect" of the experimenter is higher in this subject pool. Relating this explanation to our results, we think that it is unlikely that the high percentage of mutual links obtained by our mechanism may be due to this "demanding effect". The reason is twofold. On one hand, the low percentage of mutual links obtained in the non-incentivized treatment compared to the two rewarded treatments rules out the "demanding effect" explanation. On the other hand, the monetary reward treatment was run in a classroom whose subjects had no relationship with the experimenters.

Remark that we provided subjects with an "exit option", that is, they assure the maximum payoff if they nominate no friends. Although we provided subjects with a "weakly dominant strategy", we did not want to penalize any subject for not having friends within the class group. Even this was more important in the extra-credit point treatment which was run during an exam. In addition, this exit option makes very unlikely that subjects risk a sure payoff for nominating a false friend. Thus, we think that links reported are true. Nevertheless, we cannot differentiate wether subjects report zero links because they have no friends in the class or wether they have selfish preferences or wether they have the belief that their friends will not nominate them.

The main differences between the mechanism we proposed and the one by LMRQ are the following: *i*) the mechanism by LMRQ is useful to obtain a directed network. That is, they obtain a high number of asymmetric links. Our mechanism is designed to obtain mutual links, that is, a non directed network, *ii*) mechanism proposed by LMRQ is better if you want to obtain larger networks (taking into account that they give high incentives to name a large number of links). The mechanism we propose is more appropriate to obtain small networks as we give low incentives to name many links, *iii*) from the previous differences, we can say that networks obtained by LMRQ are overestimated and networks obtained with our mechanism are underestimated and *iv*) in LMRQ the elicitation game was not simultaneous, so players could agree in naming each other. Our mechanism is simultaneous, so problems of previous agreements are avoided. The disadvantage of simultaneous play is that we must eliminate all nodes (subjects) of the network which are not present during the experiment.

In sum, the mechanism proposed in this paper is complementary to the one by LMRQ. Depending of the aim of the network and the kind of environment you want to analyze, it will be more appropriate to use one or the other. LMRQ mechanism will be better when you need a large network with a high number of nodes and it is not important the network to be directed (for example for analyzing individual behavior in non-strategic environments). The mechanism proposed in this paper will be more appropriated for analyzing strategic environments and games played by pairs (there is an interaction between players).[13] The restriction to use the proposed mechanism is that we must have some close environment in order to have the whole network participating at the same time (for example a classroom or a company).

From an experimental point of view, mapping the social network is, certainly, only the first step. In this respect, more investigation is needed to study how, once this has been properly mapped, the network structure influences individual and aggregate behavior in social and economic contexts of interest for the social scientist.[14]

In brief, this paper is a first attempt to elicit social networks to use them as additional information to explain results in other experiments. This mechanism does not account for social relations outside the specific environment we are analyzing (in this case, the classroom). So, information about social integration of subjects in their real life is not captured by this mechanism. In spite of this problem, the proposed mechanism allows experimentalists to obtain a view of social integration of subjects in one of their most natural environments, controlling for friendship relations in the lab as a possible explaining variable of economic behavior.

[13]If we want to analyze how pairs of friends play a specific game, we need bidirectional links in order to assure that both members of the pair are friends and there is no deception.

[14]The main advantages of the mechanisms to elicit social networks respect to making the recruitment with players signing up by pairs are the following. The first advantage is that the total network is useful to afterwards compute characteristics of the node such us clustering, degree, betweenness. Those measures may be useful to explain subjects' behavior. That is, if we obtain the whole network we can use this information to explain some patterns of behavior, if we only know one friend of each participants, we are loosing information that could be relevant. The second reason is that in the recruitment by pairs, maybe participants will anticipate that the game will be played in pairs and they agree previously in sharing the profits at the end of the experiment and it may influence individuals' behavior and results would not be completely clean.

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Appendix

INSTRUCTIONS[15]

Hello, now you're going to take part in an Economic Experiment. We thank you in advance for your collaboration. This is part of a project coordinated by a teacher from the University of Alicante and he asks you for your collaboration to carry it out. The aim of this Experiment is studying how individuals take their decisions in certain environments. The instructions are simple.

If you follow them carefully, you will receive an additional POINT IN THE FINAL MARK OF MICROECONOMICS II [AMOUNT OF MONEY] confidentially at the end of the experiment.

You can ask the queries you may have at any time, raising your hand but without speaking. Except for these questions, any kind of communication between you is forbidden and subject to your expulsion from the Experiment.

Please, write a list with the name and surname of all you friends from the class. After their names, you have to write a number:

1 if you hardly know him/her; 2 He/she is an acquaintance; 3 if he/she is your friend; 4 if he/she is a very close friend.

¿How do I GET THE POINT [RECEIVE THE MONEY]? We take your list and take out randomly the name of one (only one) of your friends (the ones you have mentioned); then, we look at your friend's list and see whether:

i) he/she has mentioned you and

ii) he/she has scored you with a similar number to the one you have rated him/her (this means a maximum difference of one point).

If i) and ii) are affirmative you win THE POINT [5€]. If i) or ii) fails, then you win nothing (0 POINT [0€]).

Example. My List is:

Jose Pérez with a 3.

Juan Martínez with a 4.

Emilio López with a 1.

Jose Antonio Rodríguez with a 2.

Randomly, José Pérez was chosen from my list. They then looked at his list and he had rated me with a 4. As the difference in the scoring was just one point, I win THE POINT FOR MICROECONOMICS II [5€]. If I had rated him with 2 points, I would have won nothing.

[15] In CAPITAL are highlighted differences between TP and TM (TM in brackets).

NOTICE 1. If you mention no-one, you also receive THE POINT FOR MICROECONOMICS II [5€].

NOTICE 2. (about the notice above). Be aware that if you mention no-one but someone mentions you, you may be prejudicing him or her. In other words, a friend who mentions you would not receive THE POINT FOR MICROECONOMICS II [5€] because you don't include him/her in your friends' list [16].

[16] For the TNI treatment, instructions were as follows:

Hello, now you're going to take part in an Economic Experiment. We thank you in advance for your collaboration. This is part of a project coordinated by a teacher from the University of Alicante and he asks you for your collaboration to carry it out. The aim of this Experiment is studying how individuals take their decisions in certain environments. The instructions are simple.

You can ask the queries you may have at any time, raising your hand but without speaking. Except for these questions, any kind of communication between you is forbidden and subject to your expulsion from the Experiment.

Please, write a list with the name and surname of all you friends from the class. After their names, you have to write a number:

1 if you hardly know him/her; 2 He/she is only someone you know; 3 if he/she is your friend; 4 if he/she is a very close friend.

Thank you very much.